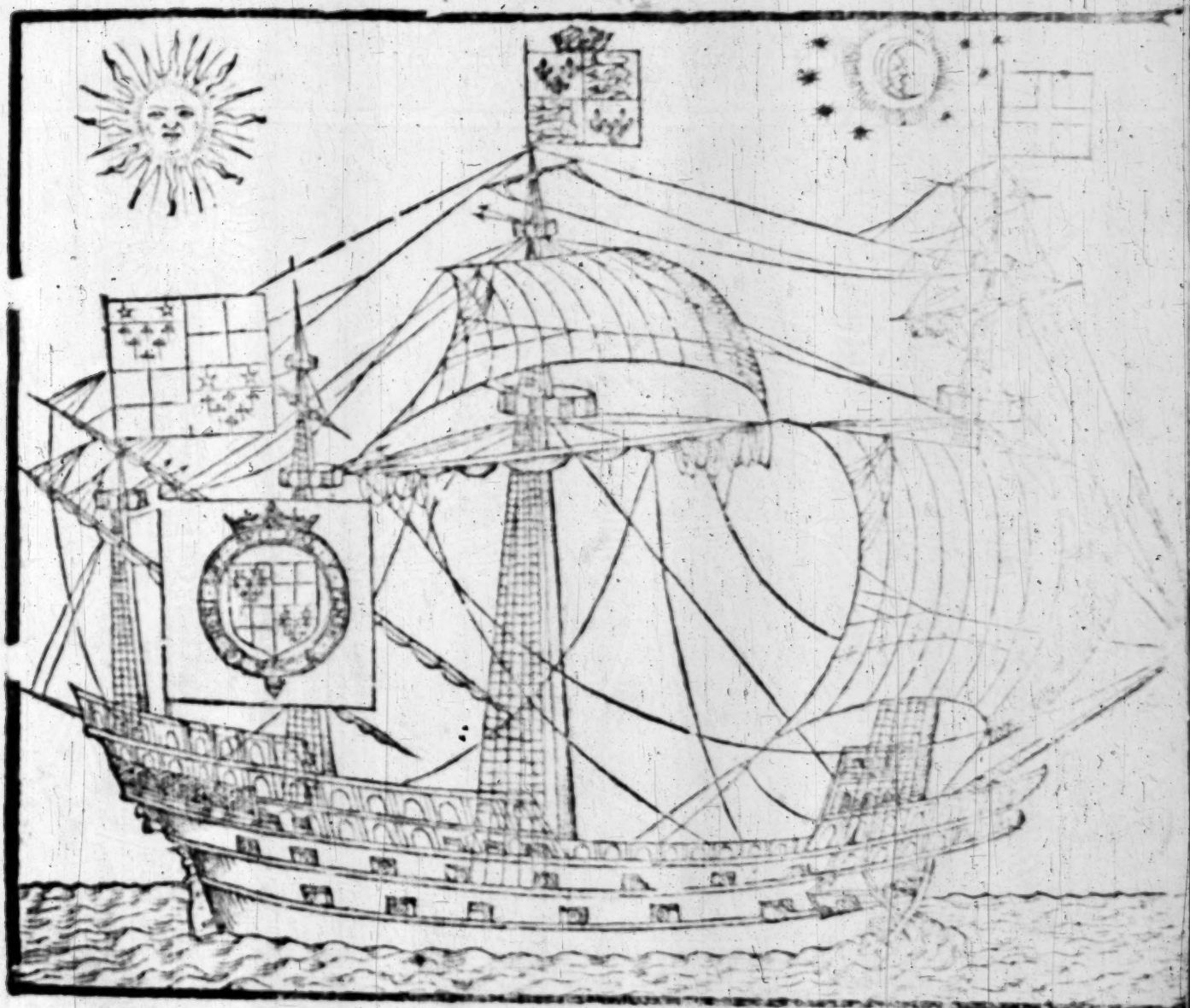
¶A Regiment for the Sea;

Containing very neceſſarie matters for

all ſorts of Sea-men and trauailers, as Maſters of Ships, Pilots, Barriners, and Marchants. Newly corrected and amended by the Author. Whereunto is added a Hydrographical diſcourſe to goe vnto Cattay, fiue ſeuerall wayes: Written by William Bourne.



¶ Imprinted at London by T. Eaſt, for Iohn Wight.

TO THE RIGHT HO-nourable, Edvvard Earle *of Lincolne, Baron of Clinton and* Say, Knight of the Noble Order of the Garter, Lorde high Admirall of England, Ireland, and Walles, and of the Dominions and Iles thereof, of the Towne of Calice, and Marches of the same, Normandie, Gascoyne, & Guyone, and Captaine generall of the Queenes Maiesties Seas and Naue Royall, William Bourne wisheth increase of Honor, in perfect health.

RIGHT Honourable, and my singular good Lorde and Master, when I had often repeated & called to my remembrance the opinion and sayings of the sage and auncient Writers, that one man should bee an Instructer vnto another, by seeking and paines taking to do them good, so at sundrie times I studied and deuised with my selfe, what thing to take in hand that might most profit my friends and Countrie: and at the length it came vnto my remembrance how necessarie a thing it was for Sea-faring men to haue some good instructions: wherevpon I haue compiled this base and simple Regiment for the Sea, and Nauigation, for that I knowe it to bee so necessarie for all sorts of Sea-men.

Therefore at sundrie times as I haue had leysure, I haue compiled and written this base and simple [illegible]

¶ All

to remembrance the ſaying of Plinie, who thought all time loſt, which he did not beſtow at his booke: I, being of all other moſt ſimple, yet notwithſtanding this enterpriſe haue I taken in hand, to publiſh this ſimple booke vnto all men.

And for that all my labours be due vnto your Honorable Lordſhip, according to my bounden dutie I preferre it vnto your Honour, hoping that your Lordſhippe will vouchſafe to take it in good part, and to receiue this barbarous worke, more to take it as any good will, (which is to offer thinges of much more excellencie) than the fineneſſe of the worke, for that it is but ſimple. And ſo ſhall I not onely be ſatisfied, but alſo further incouraged hereafter to trauel, according to the ſimple gift and talent that God hath giuen vnto me: For that it is not altogether gathered out of other bookes, but that the greateſt parte is deuiſed and practiſed by mee. Therefore I truſt my labors (ſuch as they be) ſhall not hinder the cunning & learned ſort, but further the late beginners, that are as yet not well inſtructed. And thus I ceaſe to trouble your Honorable Lordſhip any longer, deſiring you to take this ſimple thing in good part, as a true token and ſigne of my good will, beſeeching God of his grace to proſper your Lordſhip in honour and vertue with perfect health. Amen.

By your Honors poore ſeruant,

William Bourne.

The

The Preface to the Reader.

IN my opinion (gentle Reader) which also is the saying and writing of all the Philosophers, those thinges are most principally to be taught and maintained, which in the cōmon wealth are most profitable and necessarie. Then may I boldly say (without iust cause of reproofe) and affirme, that Nauigation is not the least, but one of the principall matters to be knowen, as this time doth require. Considering the state and scituation of our Countrie, for that we be inuironed round about with the Sea, so that we neither can goe out of our country, neither they that are of other Countries can come at vs, but onely by Sea. These things (I say) cōsidered, what can ther be more necessarie to be taught in our common weale, than Nauigation, considering also what Nauigation is: as Nauigation is how to direct their course vppon or through the Sea, where he findeth no path to any place assigned, and howe to attaine the port or place appointed in shortest time, how also to preserue the ship and goods in all common disturbance, as stormes, daungers by the way, and such other like, &c. Moreouer and besides that, it is not vnknowen how necessarie Nauigation is, both for the transportation of our commodities, to finde vent for them in other countries (wherby no small number of people is set a worke in England) and also the bringing of other commodities (that we haue neede of) vnto vs, by which meanes the Queenes Maiestie receiueth no smal benifit for this hir customes &c. And furthermore, for that Nauigation is the chiefe force and strength of our countrie, which whether it be true, I referre to the iudgement of all men & although I be but simple (gentle Reader) and a great number of excellēt learned men in the Mathematical science, haue written diuers bookes of Cosmographie and Nauigation, yet notwithstanding I haue written this regiment for the Sea,

with a few rules of Nauigation, as it were a Nosegay, whose flowers are of mine own gathering. And albeit the learned sort of seafaring men haue no neede of this boke, yet am I assured that it is a necessarie booke for the simplest sort of Seafaring men. For that they shall finde heere the names of the circles in the Sphere, with ỹ names of diuers things meete for Nauigation, together with their vses, which the most part of Sea men do mistake or misse-call neither doe they know the vse of them, beeing yet most necessary for them that vse Nauigation. In which also there is a Table of Declination calculated for foure yeeres (that is to say, for the yeere of our Lord 1577. the first after Bissextilis, the yere 1578. being the second yere, & the yere 1579 which is the third yeere, with the yeere. 1580. which is the yere of Bissextilis, or Leape yeere it selfe) which the Sea men doe call a Regiment, and will serue for 24 yeeres, without any great error, & is exactly calculated for the longitude of Lōdon, for the instant time of noone, & will serue all Europe and Affrica, nere vnto the coast of America, without much errour, sauing in Februarie, March, or September, whilest the Sun hath swift declination. But in Iune and December, it will serue all the world ouer: because the Sunne hath but slow declination, &c. And also there bee other necessarie Rules of Nauigation, to knowe how to handle the Sunnes declination, to know the altidude of either of the two Poles (as the contents of the booke do shew) with other necessarie things meete to be knowen in Nauigation, & not mentioned in the booke of Martin Curtise, called The Art of Nauigation. Neither do I meane to write any thing mentioned in that booke, for that it is there sufficiently declared alredy. And thus (gentle Readers) I desire you to beare with my rudenesse, that I should take vpon me to open any Science, for that I am vtterly vnlearned, & without help of any learned persons, desiring you not to conceiue anye euill opinion of me, but to take it as my good will, minding

to

to profit my natiue Countrie, as much as lyeth in me. Notwithstanding it is possible that some people will be offended with me, that I should write this simple Treatise, but then I consider againe and know, that vertue lacketh no enimies and defacers, and vice lacketh no friends & maintainers, so that knowledge lacketh no contempt, neither ignorāce lacketh furtherance, & especially among all people there is none more readie to contempne then the ignorant sort: for ignorance is the father of all errours, and the mother of contention.

And thus I drawe to ende, desiring you to take this simple worke in good part, beeing willing to pleasure my natiue country, according to the simple talent that God hath giuen me. And whereas you finde any errour, I pray you let me gently vnderstand, for I thinke not that I can so circumspectly work, but I may be deceiued, for man can not be so precise but he may erre, and I haue seldome heard of any the best authors but he hath erred in some point: Therefore in those thinges that he knoweth not of himselfe, he must needes folow his author, and if his author doe erre, he must needes fall into the same errour that his author doth. And furthermore, a number of people there be that deuise nothing else but lyes and slaunders, yea, and those which cannot attain to any thing themselues, do hate all those that be not ignorant as they themselues be: For the corrupt nature of man is such, that it is a corsey to their harts, that any should be cōmended before themselues, for generally amōgst all people of the earth (which is innumerable) euery seuerall person thinketh himselfe most worthie, imagining themselues to haue no felowes: such is the diuell in the hart of man, pāpering mans hart so with pride to think he hath no felow, wheras mā of himself is not able to doe any good thing, no, not to think one good thought,

but

but by the onely might & prouidence of almightie God, therefore of our ſelues we can doe nothing that is good. And thus gentle Reader, I make an ende. If this ſimple & barbarous thing be taken in good part, then looke for other of my workes ſhortly, and beare him good will that ſtudieth for the benefit of his natiue countrie, deſiring God of his grace, that I and you may doe the thing that may be to the laud, praiſe, and glory of God, to our commoditie and ſoules health, to the profit of our brethren, & the common wealth of this our Realme. Thus I betake you to almightie God, the creator of all things, praying him that both I and you may after this lyfe reſt in the kingdome of Heauen, with Abraham, Iſaac, and Iacob: there to remaine world without ende. Amen.

To the Reader.

Gentile Reader, I haue thought it good now in this Impression to mende or correct certaine faults that were in the first, but most specially in the second Impression: For that it was printed the second time, I not knowing thereof, so that it had not onely those faults that were printed out of the first written coppie, but now a number of new faults more than that it had in the first. Wherefore I haue not onely mended and corrected those faults, but in like manner I haue added other necessary matters, not before this time printed, as this. What excentric is, and also what Paralex is, and his vse, as it doth appeare in the 6. folio of the booke. And also I haue in like manner shewed howe that sea-men shall knowe when that the moone is in her slow and swift motion, which is knowen by the Prime, as it is declared in the third Chapter. And also how for to knowe the moones latitude as it is shewed in the 4. Chapter. And also I doe show in the 5. chapter, the cause that there is more daies, from the Equinoctiall of March vnto the Equinoctiall of September, then there is from the Equinoctiall of September vnto the Equinoctiall of March. And also I haue added vnto the 7. Chapter certaine matters as touching discoueries vnto the North parts. And furthermore, I haue shewed in the 14. chapter how for to know how fast or softly that any ship doeth goe, & how for to kæpe a perfect account of the shippes waye. And also I haue altered cleane the xvii. Chapter, & shewed howe that the sea-men shall knowe what part or quantitie that they haue passed or gone of the whole earth, wherby that they should know ỹ diuersitie of aspects as the Eclipses of the moone, & the alteration of time, & also I haue added diuers things in sundry places.

of the Booke, that I do omit for breuitie. And in like manner I haue added vnto the ende of the booke, a Hidrographicall discourse for to goe vnto Cattay 5 seuerall or sundry wayes, that is to say, the first way is about by Cape bone sperance, which is that way that the Portingalls doth goe vnto Calicut, and vnto the Moluccas, & other places in the East Indies: the seconde waye is through the straights of Magalenos, into the south sea, the third waye is towardes the Northwest, whereas Captaine Forbisher and Christopher Hall, hath begunne the discouerie now called Meta Incognita: and the fourth way is by the Northeast by the coast of Noua Zembla, that master Stephen of Borrose hath begun that discouerie. And the fifth way is by the North Pole, if that it be nauigable, &c.

Nowe it is possible that I maye be enuied of diuers and sundry people, for that I haue written this discourse of the passages vnto Cattay, for that the nature of a number of men is to dislike of all thinges not done by themselues: But notwithstanding all is one vnto me whether they do like or dislyke. For that I do know some persons hath already made euill report of that I haue written before this time, yet notwithstanding I will not stay my pen for their mallice: for although their skilles is much more than mine, my meaning is not to teach any of them, but to instruct the simplest sort of sea men, for to shew vnto them such thinges as is necessarye for them for to know. And also some sort of people are of that nature, if that they write or talke of any things past their capacitie, then they will say ỳ he can talk well, but they themselues cannot talke but they can do, but this is the truth, whatsoeuer he be that will saye that hee can doe anye thing, and if that he cannot shew the reason of the doing thereof, I doe saye vnto you he can not

doe

doe it, and this is moſt certaine, for if that he doth it, hee doth it but by fortune, euen as he that drew his bow by chaunce in the Aſsirians hoaſt, and ſlew Achab, the King of Iſrael, as we doe reade in the thirde booke of the Kings and the laſt chapter, when that Ioſaphat, the king of Iuda, and Achab, King of Iſrael, went to battaile againſt Ramoth in Gilead.

For this is generall amongſt Sea-men and alſo Gunners, how ſimple or without ſkill ſoeuer that they be, if that they haue once taken charge to be the maſter of a ſhippe, he thinketh great ſcorne to learne at any mans hand, but will bragge of himſelfe how long he hath borne a maſter, and God knoweth vtterly without ſkill, but that he is a coaſter, and doth know the markes for to carrie a ſhippe ouer the Landes ende, and ouer the Naaſe.

But good ſimple menne, if that they coulde not doe that, then there were nothinge in them: For euerye man muſt needes be ſkilfull and knowe that place that a number of times he hath occuppyed, and hath ben taught vnto him.

And who doubteth but a ſimple Fiſherman of Barking, knoweth Barking Creeke, better than the beſt Nauigator or maſter in this lande: ſo who doubteth, but theſe ſimple men doth know their owne places at home. But if they ſhould come out of the Occean Sea to ſeeke our Channell, to come vnto the Riuer of Thames, I am of that opinion, that a number of them doth but grope as a blinde man doth, and if that they do hit well, that it is but by chaunce, and not by any cunning that is in him.

But I doe hope that in theſe dayes, that the knowledge of the maſters of ſhippes is verie well mended,

for I haue knowen within this 20. yeres that them that were auncient masters of ships hath derided and mocked them that haue occupied their cardes and plattes, and also the obseruation of the altitude of the Pole, saying: that they care not for theyr shepes skinnes, for he could kepe a better account vpon a bord.

And when that they dyd take the latitude, they would call them starre shoters and sunne shoters, and would aske if they had striken it. Wherfore now iudge of their skills, considering that these two points is the principal matters in Nauigation. And yet these simple people will make no small bragges of themselues, saying: that he hath bene master this twenty yeres, and neuer had no misfortune, and also if that they could here of any, that dyd vse Plats and instruments that had any misfortune, then they would not a little brag of themselues, what notable felowes they themselues were.

O what a notable folly was in these men, not considering what they themselues were. For this is most certaune, that it is not wisedome nor cunning, that can preuent nor alter Gods prouidence, if that it pleaseth him to lay his scourge vpon vs. For if that men through cunning could prouide that no misfortune should happen vnto them, then were they Gods and not men, and yet not withstanding we must not condemne cunning and knowledge but put all things vppon Fortune, then you may take one from the plough, and make him master of a ship, and say he hath good fortune. And thus (gentle Reader) I cease, requesting thee to accept this as a simple present proceeding of good will.

Thine W. B.

For

FOr that the common people doe fall into such a number of errours as touching the length of the daye, holding an opinion, that in euery fiftæne dayes, the daye is an houre longer or shorter, the truth is this: the day doth kæpe no such proportion in the lengthning and shortning, but doth length and short according vnto the swiftnesse and slownesse of the sunnes declination: for when the sunne hath swift declination, then doeth the daye lengthen and shorten a pace: and when that the declination is slow, then doth the day lengthen or shorten but slowly. And yet the most part of the common people doe hold an opinion, that at Christmasse or else at New yæres day at the furthest, the day must nædes be an houre longer, and yet the sunne hath not declyned or come towards the Equinoctiall two degræs and a halfe, which will not make halfe an houre in the length of the daye: wherefore I do thinke it good to declare through the whole yære, when the day is an houre longer or shorter hære in this place, for the latitude or height of the Pole Articke at London, the Pole bæing raised fiftie one degræs, thirtie two minutes, or thirtie foure minutes: and our longest summer daie is sirtæne houres and a halfe, and our shortest Winter day is seauen houres and a halfe, from the rising of the sunne vnto the setting of the sunne: and first this: the shortest Winter daye, is the 11. or 12. daye of December, and then the sunne riseth a quarter of an houre after eight, and setteth a quarter of an houre before foure of the clocke, and then the sunne hath his greatest declination vnto the southwardes. And then the 29. daye of December, the daye is a quarter of an houre longer, then riseth the sunne at eight of the clocke, and settes at foure. And then the 17. or 18. of Januarie the daye is an houre longer: not before, for the sunne must be declined from his Solsticke of Winter, fiue degræs and twelue minutes, before the daye is lengthened an houre, so that I doe

affirme, that from the fourth or fifth day of November, vnto the 17. or 18. daye of January, in all that tyme the daye is but one houre shorter & longer, which is the time of ten weekes. And then the 27. or 28. of Januarie the night is fiftæne houres long, then riseth the sunne halfe an houre after seauen, and setteth halfe an houre after foure of the clocke. And then the leauenth or twelfth daye of Februarie the daye is ten houres long, then riseth the sunne at seauen, and setteth at fiue of the clocke. And then the fire and twentie day of Februarie the daye is a leauen houres long, then riseth the sunne halfe an houre after fire, and setteth halfe an houre after fiue of the clocke. And then the leuenth daye of March, then the sunne is vpon the Equinoctall, and the day iust 12. houres long all the world ouer. And then the 24. daye of March, the daye is 13. houres long, and then riseth the sunne halfe an houre before fire, & setteth halfe an houre after 6. of the clocke. And then the seauenth daye of Aprill the daye is fourtæne houres long, and then riseth the sunne at fiue of the clocke iust, and setteth at seauen of the clocke iust. And then the 23. daye of Aprill the daye is fiftæne houres long, and there riseth the sunne halfe an houre before fiue, and setteth halfe an houre after seauen of the clocke. And then the 15. day of May the daye is sixtæne houres long, then ryseth the sunne at foure of the clocke, and setteth at 8. of the clocke iust. And then the leauenth of June the sunne hath his greatest declination to the Northwarde, and then is our longest summer dayes, and then it is sixtæne houres and a halfe, from the sunne rising vnto the sunne setting, so that the sunne ryseth a quarter of an houre before foure, and setteth a quarter of an houre after eight of the clocke.

And then the tenth day of July the day is sixtæne houres long, then riseth the sunne at foure, and setteth at eight of the clocke. And then the last day of July, the day is fif-

tæne

téene houres long. And then the firtéene day of August the day is foureteene houres long. And then the last day of August the day is thirteene houres long. And then the thirteene or foureteene of September the sunne is vpon the Equinoctiall and the daie iust twelue houres longe. And then the 27. day of September the daie is eleuen houres longe. And then the 11. day of October the daye is ten houres longe. And then the 26. day of October the day is nine houres long. And then the fifteene day of Nouember the day is 8. houres long, and so vnto the leauenth or twelfth daye of December, and then the daie is at the shortest, as before is declared.

Thus much haue I said, as touching the length of the day by euen houres, which some people will haue at the enterance of the Sunne into the twelue signes, of which in the lengthing and shortning of the daye there is no such matter, but onely this: Loke when that the sunne hath declined fiue Degrees and twelue minutes in this our latitude, then is the day and houre longer or shorter, as you shall finde this matter more largelier spoken of in all places through the world, in the leauenth Chapter of the Booke.

A Table of the reigne of Kings since the Conquest.

Nũber of kings and Queenes.	The names of the kings of England.	Beginning of their Reigne.	Time of their death.	The place of their burial.
1	Willia Conqueror.	14 Oct.	9. Sept. 1087	Caen in no.
2	William Rufus.	9. Sept.	1. Augu. 1100	Westminst.
3	Henrie the first.	1. Aug.	2 Dece. 1136	Reding.
4	Stephan.	2. Dece.	25. Oct. 1154.	Feuersham.
5	Henrie the second.	25. Oct.	6. July. 1189.	Fõteuerard
6	Richard the first.	6. July.	6. April. 1199	Fõteuerard
7	John.	6. April	19 Octo. 1216	Worcester.
8	Henrie the third.	19 Oct.	16. Nou. 1272	Westminst.
9	Edward the first.	16. No.	6. July. 1307.	Westminst.
10	Edward the second	6. July.	25. Jan. 1327	Gloster.
11	Edward the third.	25. Jan	21. Jun. 1377	Westminst.
12	Richard the second	21. June	16. Sep. 1400	Westminst.
13	Henrie the fourth.	16. Sep	20. Mar. 1413	Caterburie
14	Henrie the fifth.	20 Ma	31. Aug. 1422	Westminst.
15	Henrie the firt.	31 Aug	4 Mar. 1461.	Winsore.
16	Edward the fourth	4. Mar.	9. April. 1483	Winsore.
17	Edward the fifth.	9. April	22. Jun. 1484	Westminst.
18	Richard the third.	22. Jun	22 Aug. 1486	Leycester.
19	Henrie the seuenth	22. Aug	22. Apr. 1509	Westminst.
20	Henrie the eight.	22 Apr	28. Jan. 1547	Winsore.
21	Edward the firt.	28. Jan	6. July. 1553.	Westminst.
22	Quæne Mary.	6. July.	17. Nou. 1559	Westminst
23	Quæne Elizabeth.	17 No.		

Ianuarie hath xxxj. dayes.

3	1	a	New yeeres day.
	2	b	Octa. Stepha.
11	3	c	Octa. John.
	4	d	Octa. Inno.
19	5	e	Thelospho bi.
8	6	f	Twelfe day.
	7	g	Julian mart.
16	8	a	Seuerine Bish.
5	9	b	Martian Virg.
	10	c	Paule first her.
13	11	d	Sunne in Aquari.
2	12	e	Satire Mar.
	12	f	Oct. Epipha.
10	14	g	Isidore mart.
	15	a	Maurice.
18	16	b	Anthony Abbot.
7	17	c	Marcelle Bish.
	18	d	Prisce Bish.
15	19	e	Mart. and his fel.
4	20	f	Fabian and Sa.
	21	g	Agnus Virg.
12	22	a	Vincent mar.
1	23	b	Emerice.
	24	c	Timothie discip.
9	25	d	Con. of Paul.
	26	e	Policarp. mart.
17	27	f	Chrisost. Doct.
6	28	g	Theodore.
	29	a	Valerie Bish.
14	30	b	Tran. S. marke.
3	31	c	Cir. and Jan.

Februarie hath xxviij. dayes, & in the yeere of Bissextilis xxix. dayes.

	1	d	Brigit. Fast.
11	2	e	Purif. of Marie
19	3	f	Blase mart.
8	4	g	Gilbert Confess.
	5	a	Agathe Virg.
16	6	b	Dorithie Virgin
5	7	c	Amandus Bish.
	8	d	Salamon
13	9	e	Sunne in Pisces
2	10	f	Sother Bishop.
	11	g	
10	12	a	Eufrase virgin
	13	b	Valentine Bish.
18	14	c	Faustine Bish.
7	15	d	Julian virgin.
	16	e	Constance virgin
15	17	f	Simeon martir
4	18	g	Sabine Priest
	19	a	
12	20	b	60 martirs
1	21	c	70 martirs
	22	d	Peters Chayre
9	23	e	Sirener. Fast
	24	f	Mathie Apostle
17	25	g	Policar. Bishop
6	26	a	Victor and his fel.
	27	b	Augustine Bish.
14	28	c	Oswale Bishop

The Kalender.

March hath xxxj. dayes.

3	1	d	Dauid Bishop.
	2	e	Basilic. mart.
11	3	f	Marine mart.
	4	g	Lucius mart.
19	5	a	Focius mart.
8	6	b	Vict. and Uenn.
	7	c	Tho. de Aquin.
16	8	d	Apoline mart.
5	9	e	40. Martirs.
	10	f	Gregorie bishop
13	11	g	Sunne in Aries.
2	12	a	Zacharie bishop
	13	b	Longine mart.
10	14	c	Patricius bishop
	15	d	Gertrude virgin.
18	16	e	Anselme.
7	17	f	Edward King.
	18	g	Joseph spons.
15	19	a	Cutbert bishop.
4	20	b	Benedict Abbot.
	21	c	Affrodose bishop.
12	22	d	Pigment. bishop.
1	23	e	Theodore.
	24	f	Fast.
9	25	g	Annun. of Mary.
	26	a	Castore marter.
17	27	b	John Yeremy.
6	28	c	Dorothe marter
	29	d	Eustace.
14	30	e	Sabine virgin.
3	31	f	Balbine virg.

Aprill hath xxx. dayes.

	1	g	Theodore virgin
11	2	a	Mary Egiptian
19	3	b	Richard bishop
8	4	c	Ambrose bishop
	5	d	Marci and Ma.
16	6	e	Sertus mart.
5	7	f	Cupheni. virgin.
	8	g	Denise mart.
13	9	a	Perpetuus Bish.
2	10	b	Percus mar.
	11	c	Sunne in Taurus.
10	12	d	Appoline martir
	13	e	Sother mart.
18	14	f	Tiburt mart.
7	15	g	Osmond bishop.
	16	a	Isidore Bishop
15	17	b	Anicete bishop.
4	18	c	Cluther Bishop
	19	d	Tiburtius Conf.
12	20	e	Hermogenes.
1	21	f	Quintine.
	22	g	Clete bishop.
9	23	a	Gorge mart.
	24	b	Wilfride Conf.
17	25	c	Marke Euange.
6	26	d	Anastace bishop.
	27	e	Vitalis mart.
14	28	f	Peter of Yi.
3	29	g	Clete bishop.
	30	a	Dep. of Erken.

The Kalender.

May hath xxxj. dayes.

11	1	b	Philip and Iacob
	2	c	Athanasius bish.
19	3	d	Inu. of the crosse.
8	4	e	Christopher.
	5	f	S. Augustine.
16	6	g	John Port. lat.
5	7	a	John of Beuer.
	8	b	Appe. of Mich.
13	9	c	Trasl. of Ni.
2	10	d	Gordaine.
	11	e	Sunne in Gemini
10	12	f	Victorius mart.
	13	g	Seruatius Con.
18	14	a	Boniface mart.
7	15	b	Sophia virgin.
	16	c	Brandon bishop.
15	17	d	Transl. of Bar.
4	18	e	Dioscor. martir
	19	f	
12	20	g	Dunstan conf.
1	21	a	Barnardine.
	22	b	Helene Quæne
9	23	c	Petronill.
	24	d	Julian virg.
17	25	e	Desidere mart.
6	26	f	Adelme. Conf.
	27	g	
14	28	a	Germaine bish.
3	29	b	Nicodeme.
	30	c	Corne mart.
11	31	d	Felix bishop.

June hath xxx. daies.

19	1	e	Nicodeme.
	2	f	Erasmus.
8	3	g	Basill.
16	4	a	Marcel martir.
	5	b	Petrocus Conf.
5	6	c	Boniface bishop
	7	d	Medard and Gil.
13	8	e	Transl. Edmond.
2	9	f	Yuan Confes.
	10	g	Tran. of Wol.
10	11	a	Barnabe Apost.
	12	b	Sunne in Taurus
18	13	c	Anthony Confes.
7	14	d	Basilides con.
	15	e	Vate modeste.
15	16	f	Transl. Richard.
4	17	g	Botulph confes.
	18	a	Cruperie bishop.
12	19	b	Gerualius mar.
1	20	c	Tran. Edward.
	21	d	Walburge vir.
9	22	e	Albane mart.
	23	f	Fast.
17	24	g	Iohn Baptist.
6	25	a	Transl. of Elig.
	26	b	John and Pa.
14	27	c	Crescens mart.
3	28	d	Fast.
	29	e	Peter and Paule.
11	30	f	

			July hath xxxj. dayes.
19	1	g	Octa. John. Bap.
8	2	a	Visit. of Mary.
	3	b	Gregorie Bishop
16	4	c	Domitius mart.
5	5	d	Parthene Con.
	6	e	Procope mart.
13	7	f	Zenone mart.
2	8	g	Paterian Bishop
	9	a	Pius Bishop
10	10	b	Dog dayes be.
	11	c	Hermaco. for.
18	12	d	Anaclete bishop
7	13	e	Anrine & Ju.
	14	f	Sunne in Leo
15	15	g	Marine virgin
4	16	a	Simph. cum 7,
	17	b	Arlene hem.
12	18	c	Prarede virgin
1	19	d	Margar. virgin
	20	e	Prarede virgin
9	21	f	Appoline bishop
	22	g	Mary Magda.
17	23	a	Christian.
6	24	b	Fast
	25	c	Iames Apostle
14	26	d	Anne mo. of Ma.
3	27	e	Panthaleon.
	28	f	Sampson bishop
11	29	g	Mary virgin
	30	a	Abbo and Sen.
19	31	b	German bishop

			August hath xxxj. dayes.
8	1	c	Lammas.
16	2	d	Steuen bishop
	3	e	Finding of Ste.
5	4	f	Iustine Priest
	5	g	Festum nuns.
13	6	a	Trasl. Domi,
2	7	b	Feast of Jesu.
	8	c	Cirack & his fel.
10	9	d	Roman mart.
	10	e	Laurence mart.
18	11	f	Tiburt and Su,
7	12	g	Clare Virgin.
	13	a	Ypolite Virgin.
15	14	b	Sunne in Virgo
4	15	c	Assump. of Mary.
	16	d	Roche Confess.
12	17	e	Octa. Laurence
1	18	f	Agapite mart.
	19	g	Lewes bishop.
9	20	a	Dog dayes end.
	21	b	Anastase mart.
17	22	c	Timo and Hip.
6	23	d	Eleazor. Fast.
	24	e	Barthol. Apostle.
14	25	f	Lewes King.
3	26	g	Zepherine bishop
	27	a	Rufus mart.
11	28	b	Augustine bishop
	29	c	John beheaded.
19	30	d	Felix and Auda.
	31	e	Cuthber. Virgin.

September hath xxx. dayes.				October hath xxxj. daies.			
8	1	f	Giles Abbot.	16	1	a	Remigius bishop.
16	2	g	Anthony mart.	5	2	b	Leodegar mart.
5	3	a	Cupheme.	13	3	c	Candide mart.
	4	b	Moses Pro.	2	4	d	Frances mart.
13	5	c	Venturine.		5	e	Faith virgin.
2	6	d	Zacharie Prop.	10	6	f	Cerions.
	7	e	Cnurce Bishop		7	g	Marce and mart.
10	8	f	Nativitie of Ma.	18	8	a	Apolmaris mart.
	9	g	Gorgone mart.	7	9	b	Pelagi virgin
18	10	a	Nicholas de To.		10	c	Linus Conf.
7	11	b	Protece and H.	15	11	d	Denice & his fel.
	12	c	Sire Bishop	4	12	e	Nichasius bishop.
15	13	d	Philip bishop		13	f	Wilfride bishop
4	14	e	Sunne in Libra.	12	14	g	Sunne in Scorpio
	15	f	Nicodeme Priest	1	15	a	Calirt bishop
12	16	g	Edith Virgin		16	b	Wolfran bishop
1	17	a	Lambart bishop	9	17	c	Rich. of the mont
	18	b	Victor and Cor.		18	d	Luke Euangelist
9	19	c	Eustace.	17	19	e	Etheldred virgin
	20	d	Fast.	6	20	f	Fridel wide virg.
17	21	e	Mathew Apostle.		21	g	Austrebet virgin.
6	22	f	Maurice.	14	22	a	n. M. Virgins.
	23	g	Line mart.	3	23	b	Mary Salome.
14	24	a	German Abbot.		24	c	Romane bishop
3	25	b	Cleophin & Ap.	11	25	d	Magiore bishop
	26	c	Cipzian and Jul.		26	e	Chrisp. and Cris.
11	27	d	Cosme and Da.	19	27	f	Fast.
19	28	e	Crupere bishop.	8	28	g	Simon and Iude.
	29	f	Michael Arch.		29	a	Narcissus bishop
8	30	g	Hierome Doct.	16	30	b	Germaine Conf.
				5	31	c	Fast.

Nouember hath xxx. dayes.				December hath xxxj. daies.			
	1	d	All Saints.		1	F	Elegi Bishop.
13	2	e	All Soules.	13	2	g	Liban mart.
2	3	F	Wenefride virg.	2	3	a	Dep of Osmond.
	4	g	Amantius.		4	b	Barbara Virg.
10	5	a	Lete Priest.	10	5	c	Sabba Bishop.
	6	b	Leonard.		6	d	Nicholas bishop
18	7	c	Wilborde.	18	7	e	Octa. Andrew.
7	8	d	Foure crowned.	7	8	F	Con of Marie.
	9	e	Theodore.		9	g	Cipzian bishop
15	10	F	Martine.	15	10	a	Eulalie Virgin
4	11	g	Martine bishop	4	11	b	Antippe.
	12	a	Brise bishop		12	c	Damase Conf.
12	13	b	Sunne in Sagitt.	12	13	d	Sunne in Capric.
1	14	c	Tran Erkenew.	1	14	e	Nicasius Virgin
	15	d	Macute bishop		15	F	Othalie Virgin
9	16	e	Dep. of Edmond.	9	16	g	O Sapientia.
	17	F	Init Reg. Elizab.		17	a	Lazarus con.
17	18	g	Octa. Martine	17	18	b	Gratian bishop
6	19	a	Elizabeth mart.	6	19	c	Venetia virgin
	20	b	Edmond Kinc.		20	d	Fast.
14	21	c	Pres. of Marie.	14	21	e	Thomas Apostle
3	22	d	Cicely virgin.	3	22	F	rrr. martirs.
	23	e	Clement mart.		23	g	Victor virg.
11	24	F	Grisogon mart.	11	24	a	Fast.
19	25	g	Catherine virg.		25	b	Christmas day
	26	a	Line mart.	19	26	c	Stephen Mart.
8	27	b	Vitalis Conf.	8	27	d	Iohn Euang.
	28	c	Rufus mar.		28	e	Innocents day
16	29	d	Saturni. Fast.	16	29	F	
5	30	e	Andrew Apostle	5	30	g	Tran. of James.
				13	31	a	Siluester mart.

A Ta-

A Table or Kalender for 24. yeeres,

shewing the Prime, the Sundayes letter, and leape yeere, and the mouable feastes, as the first Sunday in Lent, and Easter day, Ascention daye, and Whitsunday.

The yeere of our Lord	The Prime	Dominicall Letter.	First sunday in Lent.	Easter day	Ascencion day.	Whitsunday.
1579	3	d	8. March.	19 April	28. May	7. June.
1580	4	cb	20. Febru.	3. April	12. May	22. May
1581	5	a	12. Febru.	26. March	4. May	14 May
1582	6	g	4. March.	15. April.	24. May	3. June
1583	7	f	17. Febru.	31. March	9. May	19. May
1584	8	ed	8. March.	19. April	28. May	7. June
1585	9	c	28 Febru.	11. April	20. May	30. May
1586	10	b	20. Febru.	3. April.	12 May	22. May
1587	11	a	5. March.	16. April.	25. May	4. June
1588	12	gf	24. Febru.	7. April	16 May	26. May
1589	13	e	16. Febru.	30. March	8. May	18. may
1590	14	d	8. March.	19. April.	28 May	7. June
1591	15	c	21. Febru.	4 April	13 May	23 may
1592	16	ba	12. Febru.	26. March	4. May	14. may.
1593	17	g	4. March.	15. April	24. May	3. June.
1594	18	f	17. Febru.	31 March	9. May	19. may.
1595	19	e	9. March.	20. April	29 May	8. June.
1596	1	dc	28. Febru.	11. April.	20. May	30. may.
1597	2	b	13. Febru.	27 March	4. May	15. may.
1598	3	a	5. March.	16. April	25. May	4 June.
1599	4	g	25 Febru.	8. April.	17 May	27. may.
1600	5	fe	9. Februa.	23 March	1. May	11. may.
1601	6	d	1. March.	12. April	21 May	31. may.
1602	7	c	21. Febru.	4. April	13. May	23. may
1603	8	b	13. March	24 April	2. June.	12. June

A profitable and necessary rule to know the beginning and ending of euery Terme, with their Returnes.

Hillary Terme beginneth the xviii. of January, if it be not sunday, which then is referred vntill the nert day after, and endeth the xii. of Februarie, and hath foure Returnes, that is to say:

Octauis Hillarij	Crastino Purific.
Quind. Hillarij	Octauis Purific.

Easter Terme beginneth xvii. dayes after Easter, and endeth the Munday nert after the Ascention day, & hath fiue Returnes, that is to say:

Quind. Pasch.	Mens.	Quinque Paschæ.
Tres Paschæ.	Paschæ.	Crast. Ascention.

Trinitie Terme beginneth the Friday nert after Trinitie sunday, and endeth the Wednesday fortnight after, and hath foure Returnes, that is to say:

Crast. Trinitatis.	Quind. Trinitatis.
Octauis Trinita.	Tres Trinitatis.

Michaelmas Terme beginneth the ix. day of October, if it be not sunday, & endeth the xviii. or xix. of Nouember, and hath eight Returnes, that is to say:

Octauis Michael.	Crast. Animarum.
Quind. Michael.	Crast. Martini.
Tres Michaelis.	Octa. Martini.
Mense Michael.	Quind. Martini.

Note also that the Exchequer openeth eight dayes before any Terme begin, except Trinitie Terme, which openeth but foure dayes before.

Thirtie dayes hath September, Aprill, June, & Nouember, February hath xxviii. alone: & all the rest thirtie and one,

¶ An introduction vnto the Regiment for the SEA.

¶ The names of certaine thinges necessary to be knowne of them that are Marriners or Seafaring men, meete to be knowne of them that do practise Nauigation, as this: the names of the circles of the Sphere, & what they are, and theyr vses: and also the names of other things belonging thereunto, and what they are, and their vses.

First, what the Horizon circle is.

THe Horizon is the parting of the Earth, or the Sea, and the Skie, that is to say, the halfe of the heauens being aboue ouer your head, & the other halfe hidden with the earth or Sea vnder them: and this Horizon circle doth moue as you do moue: for as you doe by trauaile change your place, so doth the Horizon change in all points.

The vse of the Horizon circle.

The vse of the Horizon circle is this, to take the height of the Sunne or any Starre, with the crosse staffe, setting the one ende with the Horizon, & the other ende with the Sunne or starre, so that you haue a true Horizon: & that must be done vpon the Sea, or else it must be a very plaine ground vpon the top of a hill, else it is no true Horizon. And also if the Sunne or Moone, or any starre bee to be seene, then they be aboue the Horizon: if they be not to be seene, then they be vnder the Horizon.

2. What the Meridian circle is.

The Meridian is a circle beginning due South, & so passing by your Zenith, that is right ouer the crowne

of your head, and so by the two Poles of the world: and if you doe trauaile due South and North, you doe not chaunge your Meridian: but in the going or trauailing any other waie, you doe chaunge it.

The vse of the Meridian circle.

The vse of the Meridian Circle is, to know the iust time of noone by the sunne: for as soone as the middle of the sunne is vpon the Meridian, then it is noone, & when the sunne, Noone, or any starre is vpon the Meridian, then they be farthest from the Horizon, and it is a meete time to take their height, for to know ỳ altitude or height of the Pole of the worlde, whereby you may perfectly knowe, how farre you be to the southwards, or Northwards of any place.

3 What the Equinoctiall circle is, being a paralel lyne, or circle fixed.

The Equinoctiall is a fixed circle in the heauens, equally distant from both the Poles, & doth passe directly ouer the middle of the earth round about, and is called the Equinoctiall, for that if the sunne be there, then throw all the whole worlde the sunne is 12. houres aboue the Horizon, & 12. houres vnder ỳ horizõ, sauing vnder ỳ two poles, & there the Equinoctial is with the Horizon. So they shal see halfe the sunne & no more, till the sunne be departed from the Equinoctiall, and also to them that doe inhabite or dwell in any place vnder the Equinoctiall, the sunne, Noone, and all the starres, be twelue houres aboue the Horizon, and twelue houres vnder the Horizon.

The vse of the Equinoctiall circle.

The vse of the Equinoctiall, is to know what declination the sunne or any other starre hath from it, and of which side, and by that is knowne the height of the Equinoc-

quinoctial, and by the height of that is knowen the height of either of the two Poles of the world.

4 What the circle or Tropicke of Cancer is, beeing a paralel circle fixed.

The Tropicke of Cancer, is the greatest declination that the Sunne doth come vnto the Northwardes, and then is our longest Summer dayes, and shortest nights.

5 What the circle or Tropicke of Capricorne is, being a paralel circle fixed.

The Tropicke of Capricorne, is the greatest declination that the sunne doth goe vnto the Southwards, and then is our shortest Winter daies, and longest nights.

The vses of these two circles be but small, but that the daies being at the longest or shortest, the sunne doth returne backe againe, &c.

6 What the Articke circle is, being a paralel circle.

The Articke circle doth touch the Horizon due North, and is according to the place that you are in, of any place vppon the face of the earth, & doth widen & narow according to the altitude or height of the Pole: for as you do go vnto the south parts, then doth your Articke circle grow narrower and narrower, vntill you come right vnder the equinoctiall line, & then haue you no Artick circle: & if that you do go vnto the North parts, then doth your Articke circle grow wider and wider: & where the North Pole is raised 66. degrées & a halfe, there ỳ Artick circle is iust with the Tropick of Cancer, & then vnder ỳ North Pole, ther your Articke circle is with the Equinoctial.

The vse of the Articke circle.

The vse of the Articke circle, is to know what starres doe neuer set vnto you, for all those starres or lyghtes that you do see vnder the Pole, do not set: and if that you be vnto the Northwards, of the height of the Pole, more

than 66. degrées and a halfe: if that the Sunne or Moone be in the Tropicke of Cancer, they shall not goe downe vnto you vnder the Horizon, but shall be still in sight vnto you, so that they be not let by the clowdes and other accidents.

7. What the Antartike circle is, being a Paralel circle.

THe Antartick circle doth touch ỹ Horizon due South, and is opposite or right against the Artick circle, and doth wide and narowe in all pointes, and doth not differ from the Artick circle, saving the Artick circle is aboue the Horizon, and the Antertike circle is vnderneath the Horizon.

The vse of the Anterticke circle.

THe vse of the Anterticke circle, is as the Artick is, in all points to know what starres will not appeare aboue your Horizon, and in like manner, to the Northwardes of 66. degrées and a halfe, (the Sunne or Moone beeing in the Tropicke of Capricorne) then they will not rise aboue the Horizon.

8. What the Zodiacke is, being a circle.

THe Zodiacke is the greatest circle in all the heauens wherein all the wandering lightes or Planettes doe keepe their courses, that is to say, the Sun and Moone, and the other fiue Planets or starres, that is to say. Saturne, Iupiter, Mars, Venus, & Mercurie, &c. which circle is diuided into twelue equall partes called the xii. signes, as Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces, the which circle standeth oblique or awrie, crossing the Equinoctiall in the middle at two places: the Northmost parte in the middle of the Zodiacke, and that is the Tropicke of Cancer: and the Southermost parte is the Tropicke

of

of Capricorne, the very middle of the Zodiacke: and that lyne in the middle of the Zodiacke, is called the Ecliptick lyne, and the Zodiacke is 12. degrees broade, that is to say, fiue degrees from the Ecliptik line vnto the North parts, and fiue degrees vnto the South parts.

The vse of the Zodiacke.

The vse of the Zodiacke is, through the moouing of the Sunne and Moone, and the other Planets, to knowe in what signe they be, and also to knowe the time of the chaunge of the Moone, with all the other aspects: and in like manner to know the aspects of all the other Planets vnto the Moone, and also the planets amongst themselues: and by the aspects in the xii. signes is gathered their effects, and in what Countrey it may happen.

9 What the lyne Ecliptick is.

The line Ecliptick, is a Circle in the very middle of the Zodiacke, the which the very middle or center of the Sunne doth goe vpon.

The vse of the line Ecliptick.

The vse of the line Ecliptick is this, if that the Moone or any other starre, be vnto the North part thereof, then it is said, that they haue North Latitude, and if vnto the South part, than they haue South Latitude: and also by this Circle called the line Ecliptick, is knowen the Eclipse of the Sunne and the Moone.

10 What the Articke polar circle is, being a paralel circle fixed.

The Articke poler Circle, is made by the pole of the Zodiacke, or pole of the circle Ecliptike 23. degrees and a halfe in the heauens from the poles of the world, aboue the Horizon.

11 What the Antarticke Polar circle is, being a Paralel circle fixed.

The Antartick Polar circle, is iuſt oppoſite vnto the Artick Polar, made by the Antarticke pole vnderneath our Horizon. The vſe of the I will declare, when I ſpeak of the Poles of the Eclipticke or Zodiacke.

12 What the two circles called Colures be, &c.

The .2. Circles called Colures, be thoſe that do deuide the Zodiacke, and all the other paralel circles, into foure equall parts, the one of the circles doth croſſe the Zodiack in the firſt point of Aries and Libra, and ſo palleth by the poles of the world, and is called the equinoctiall colur: and the other Colure circle doth croſſe the Zodiake in the firſt point of Cancer & Capricorn, and ſo palleth the 2. Poles of the world, & ther at the 2. poles the one circle doth croſſe the other: and that is called the Solſtitiall Colure.

The vſe of theſe two circles.

The vſe of the 2. Colure circles is this, the ſunne paſſing by them, doth deuide the yeare into 4. parts: as this, the ſunne in the firſt point of Aries is ſpring time, &c.

13 What the 2. Poles of the world is, imagined to be as an Axiltree.

The 2. Poles of the world, imagined to be as an Axiltree, (that is to ſay, the North Pole called the Pole Artick, & the ſouth pole called the Pole Antartick) the one is directly againſt the other: the North Pole alwaies aboue your Horizon, & the South Pole Antartick alwaies vnder our Horizon, being fixed faſt in the heauens, & the Equinoctiall iuſt and equally betweene them: & the cauſe why that is imagined to be an Axiltree is this, for that the whole heauens, and all the lights of the firmament be caried round about from the Eaſt vnto the weſt in xxiiii. houres:

houres: so that no light nor place remaineth vnremoued, but onely the two Poles of the world.

The vse of the Poles of the world.

The vse of the two Poles is this, to know how farre we doe transport our selues, and to know what Climate and temperatenesse we be in, as touching heate & colde.

14 What the two Poles of the Zodiacke is, imagined to be an Axiltree in the Heauens.

The two Poles of ỹ Zodiacke or Eclipticke, imagined to be as an Axiltree, (the Artick Pole of the Zodiack or rather the Eclipticke, & the Antartick Pole of the Zodiacke) the one being directly against the other, and the Zodiacke or rather the middle thereof, called the Eclipticke, to be iust or equal betweene them, are called ỹ poles of the Zodiacke: for that the sunne and the Mone, and the other Planets and fired starres doe moue vnto the Eastward, according to the standing of the Zodiacke, &c.

The vse of the Poles of the Zodiacke.

The vse of the two Poles of the Zodiacke is this, (as it is before declared) that the Zodiacke is deuided into 12 equall parts, called the 12. signes, and those diuisions by imagination doe passe vnto the Poles of the Zodiacke, in such forme as ỹ Meridian lines doe all meete at ỹ poles of the world, & so doe all those diuisions meete at the two Poles of the Zodiacke, & then any starre, ỹ is out of the Zodiacke, either vnto the Southwards or Northwards, (according vnto those diuisions, they be called in ỹ signes.

15 What the Zenith or vertical point is, imagined to be as an Axiltree.

The Zenith or verticall point, is imagined to be a pricke in the heauens right ouer the crowne of your head, and

and is moueable as we our selues be, and is as an Axiltree vnto the Horizon circle: and as you doe transport your selfe from one place vnto another, so doth your Zenith or verticall point, and your horizon circle also.

The vse of the Zenith or verticall point, &c.

The vse of the Zenith or verticall point is this, to know how nere or how far of, any starre is from your Zenith, by taking the true height of any starre with an instrument, for that from your Zenith, is alwaies 90. degrees downe vnto the Horizon on euery side round about you, as it shall more plainely appeare hereafter, where I speake of Degrees.

16 What a degree is.

A degree is the part or deuision of a whole circle into 360. equall parts, how big or small soeuer the circle be.

The vse of the degrees is manyfold.

The vse of the degrees, is to know by the Sunne and Moones course in the Zodiacke, or any other of the Planets or moueable starres, how many degrees they be asunder: whereby is knowne at what time they haue any aspect the one with the other. And also by the degrees it is knowen what latitude & what declination any light or starre hath from the Ecliptick or Equinoctiall: and also the degrees will shew vnto you how many miles that you doe transport your selfe, vpon the earth to the South or North parts, for that euery degree doth answere vnto 60. English myles, in the going South and North: which is knowen by the altitude of the North Pole, or the number of degrees betweene the Equinoctiall & your Zenith or verticall point, for from your Zenith vnto the Horizon, is 90. degrees to the Southwards, and 90. degrees vnto the Northwardes, which is halfe the com-

passe

passe of the heauens, for twice 90. is 180, and then the earth doth hide the other halfe of the heauens: and twice 180. maketh 360. the whole contents of the compasse of euery great Circle in the heauens.

17 What a Minute is.

Of Minutes there be two sorts, minutes of time, and minutes of measure, and is no other thing but the lesser part of time or measure, which is the 60. part of a Degree, or the 60. part of an houre: and all the deuisions in these matters is by 60. For as 60. minutes is a degree, or an houre, so 60. seconds is a minute, and 60. thirds is a second, and 60 fourths is a third, &c.

18 Altitude is height: the vse thereof.

Altitude is the height of any thing taken, as the height of the Sunne or any starre, or the height of the Pole, aboue the Horizon: or the height of a steeple, or tower, or such other lyke.

19 Latitude is wideneſſe: the vse thereof.

Latitude is in the heauens: if the Moone or any other starre be vnto ỹ South parts or the North parts of the Ecliptick, that then it is sayd, to be so many degrees in latitude or wideneſſe, frō the line Ecliptick to the South or North part: & also Latitude is counted vpon the earth in like maner, if that you be in any place betweene, from vnder the equinoctial, either to the South or North part, betweene any of the two Poles, that you are so many degrees in latitude from the Equinoctiall, &c.

20 Longitude is length: the vse thereof.

Longitude in the heauens is, if the Sunne or Moone or any other starre, be in such a signe, and so many degrees:

grées: that then it is sayde, that they haue longitude in such a signe, and so many degrées. And also longitude vpon the earth, is counted from the Canarie Ilandes vnto the Eastward, as this, if that any towne or citie, be vnto the Eastward so many degrées from the Canary Ilands, then it is sayd, that the Citie or towne is so many Degrées in longitude, whereby is knowne the time of the chaunges of the Moone, or any other aspect, or any Eclipse of the Sunne or Moone at the Citie or towne.

21 Declination is leaning: the vse thereof.

Declination is counted in the heauens, if ỳ the sunne or any other starre be vnto the North part or south part of the Equinoctiall, then it is said, that the sunne or starre hath so many degrées of declination to the South, or to the North parts as it happeneth, &c.

22 Circumference is the compasse of a circle by the outer edge.

23 Diameter is the bredth of a circle, passing right ouer ỳ center or middle thereof, from outside vnto outside.

24 Center is the middle pricke in any circle, equally distant from the edge of the circle in euery place.

25 A Paralel line or circle is, if two lynes or more, (how many soeuer there be) be equally distant in euery place alike, being right lines.

26 Auge, what it is.

Auge is a point in the heauens, when the Sunne or Moone is erentricke, going nearer vnto the heauens, and further from the Earth, than her common order is: and the oppolition thereof is, when that the Sunne & Moone doe come nearer vnto the earth, than they do at any other tyme.

The vse thereof.

The vse thereof is, to knowe when that they bée in their

their swift motion, or in their slow motion: in the point of Auge, they be in their slowe motion, in the opposition thereof in their swift motion.

27 Excentrex, what it is.

Excentrex is, when either the Sunne or Moone are towards the point of Auge, or the opposition thereof, and then the Center of the Sunne or Moones sphere is not in the Center of the Earth: the vse thereof is shewed in the Auge. Additions.

28 What the head or tayle of the Dragon is,

The head of the Dragon, is the place where that the Moone doth come ouer the line ecliptik from the South part vnto the North part: and the taile of the Dragon is, where the Moone passeth ouer the lyne eclipticke, from the North part, vnto the South part.

The vse of the heade and taile of the Dragon.

The vse of the head and taile of the Dragon, is to know, when that there is any Eclipse of the Sunne or Moone: and of what quantitie or greatnes the Eclipse is.

29 Paralex what it is.

Paraler is, when that the Moone or the two Planets Venus or Mercurie, are in coniunction or nære any star, by the meanes of the Deameter or thicknesse, that the superfices is from the center of the earth, & the nærnes of them vnto the earth, that so accordingly, that in some parts of the Skyes it shall seeme nærer or farther vnto those starres, than in some parts, which reason groweth by the Semideameter of the earth, for that you are not in the Center, when that you do beholde it. Additions.

The vse thereof.

The vse of Paraler is mainifolde, for that it sheweth where and in what countreyes that the Sunne is eclipsed as in some places the Sunne may be all wholly Eclipsed and in some place halfe eclipsed, and in some parts of the earth nothing eclipsed at all, and yet the Sunne and the Moone both aboue the Horizon, which reason is before shewed. And also the vse of Paraler is, if that you do see any extraordinarie light in the heauens, as Comets or blazing starres, by their Paraler their distaunce is knowne what they are from the earth, and by their distance their Diameter being taken, then the magnitude of the body is knowen, therfore there be great things to be knowen by the obseruation of the Paraler.

30 What Nauigation is.

Nauigation is this, how to direct his course in the sea, to any place assigned, and to consider in what direction, what thinges may stand with him, and what things may stand against him, hauing consideration how to preserue the ship in all stormes and changes of weather that may happen by the way, to bring the shippe safe vnto the port assigned, and in the shortest time.

The vse of Nauigation.

The vse thereof is this, first to knowe how that the place doth beare from him, by what winde or point of the compasse, and also how farre that the place is from him, and also to consider the streame, or tide gates & Currents, which waye that they doe sette or driue the shippe, and also to consider what daungers is by the way, as Rockes and Sandes, and such other lyke impediments, and also if that the winde chaunge or shifte by the way, to consider which way to stand, and direct

his

his course vnto the most aduantage, to attaine vnto the port in shortest time: and also if any stormes do happen by the way, to consider how for to preserue the ship and the goods, and to bring her safe vnto the port assigned. And also it is most principally to be considered and foreseene, that if they haue had by occasion of a contrarie tempest, for to goe verie much out of the course or way, to know then how that the place doth then beare, that is to say, by what point of the compasse the place doth stande from you: and also how farre it may be from you. Which way to be knowen, is this: First, to consider by what point that the ship hath made hir way by, and how fast or slowly that the ship hath gone, and to consider how often that the ship hath altered hir course, and how much that shee hath gone at euerie time, and then to consider all this in your plat or card, & so you may giue a neere gesse, by what point or winde it beareth from you, and also how farre it is thether. And also you may haue a great helpe by the Sunne or starres, to take the height of the pole aboue the Horizon, and also in some place you may gesse by the sounding, both by the depth & also by the ground. And also it is verie meete and necessarie to know any place when that he doth see it.

31 Of Instruments to vse at the Sea, for to take the height of the Sunne, or any Starres.

All Instruments to take the height of the Sunne or any Starre, the originall of the making thereof, it is either a Circle, or the part of a Circle, whose diuision is the 360. parte of a Circle, what forme so euer that it hath, as your crosse staffe it is marked according vnto the proportion of a Circle: and euerie one of the degrees is the equall parte of a Circle the three hundred and sixtie part, &c.

The vse of the Instruments.

The vse of the Instruments, as Astrolobes, or common ringes, or the crosse staffe, is to take the height of the Sunne or other starres, whose vses doe followe heere after in the booke.

32 What manner of persons be meetest to take charge of ships in Nauigation.

As touching those persons that are meet to take charge, that is to say, to be as Master of ships in Nauigation, he ought to be sober and wise, & not to be light or rash headed, nor to be too fumish or hastie, but such a one as canne wel gouerne himselfe, of or else it is not possible for him to gouerne his company well: he ought not to be too simple, but he must be such a one as must keepe his company in awe of him (by discretion) doing his company no iniurie or wrong, but to let them haue that which men ought to haue, and then to see vnto them that they doe their labour as men ought to do, in all points. And the principal point in gouernment is, to cause himselfe, both to be feared and loued, & that groweth principally by this meanes, to cherish men in well doing, and those men that be honestly addicted, to let them haue reasonable preheminence, so that it be not hurtfull vnto the Merchant, nor to himselfe, & to punish those that be malefactors & disturbers of their cõpanie, and for small faults to giue them gentle admonition to amend them: and principally these two points are to be foreseene by the Masters, (that is) to serue God himselfe, & to see that all the whole company do so in like maner, at such conuenient time as it is meete to be done: the second point is, that the maister vse no play at the dice or cardes: neither (as neere as he can) to suffer anye, for the sufferaunce thereof may do very much hurt, in diuers respects: and furthermore, the master ought to be such a one,

as

as doth know the Mones course, whereby he doth know at what time it is a full sea, or a low water, knowing in what quarter or part of the skie, ý the Mone doth make a full sea at that place, and also the master ought to bee acquainted, or know that place well, that he doth take charge to goe vnto (except that he haue a Pilot) and also he that taketh charge vpon him, ought to be expert how the tide gates or currents, doe set from place vnto place: and also not to be ignorant of such daungers as lyeth by the way, as rockes, sands, or bankes, and also most principally, he ought to be such a one as can very wel direct his courses vnto any place assigned, & to haue capacitie how for to handle or shift himselfe in foule wether or stormes. And also it behoueth him to be a good coaster, that is to say, to know euery place by the sight thereof. And also he that taketh charge for long voiages, ought to haue knowledge in plats or cardes, & also in such instruments, as be meete to take the height of the sunne or any starre, & to haue capacitie to correct those instrumẽts, & also he ought to be such a one, that can calculate the sunnes declination, or else to haue some true regiment, and also he ought to know how to handle the sunnes declination, when that he hath taken the height of the sunne.

Now beginneth the Regiment for the Sea, the first Chapter of Nauigation, & sheweth what the 32. points of the Compasse is, and to what vses they doe serue.

THE first and most princiall thinge for any seafaring man, or trauailer, is to know toward what part of the Earth he meaneth to goe, and then bering vppon the Sea, there he seeth no path nor marke to trauaile by, but onely the vse of the Needle or Compasse. And to shew the cause how they in olde time did finde thē or called them, is sufficiently declared by other, but this is to be noted: ther

be

Eight capitall or head points.

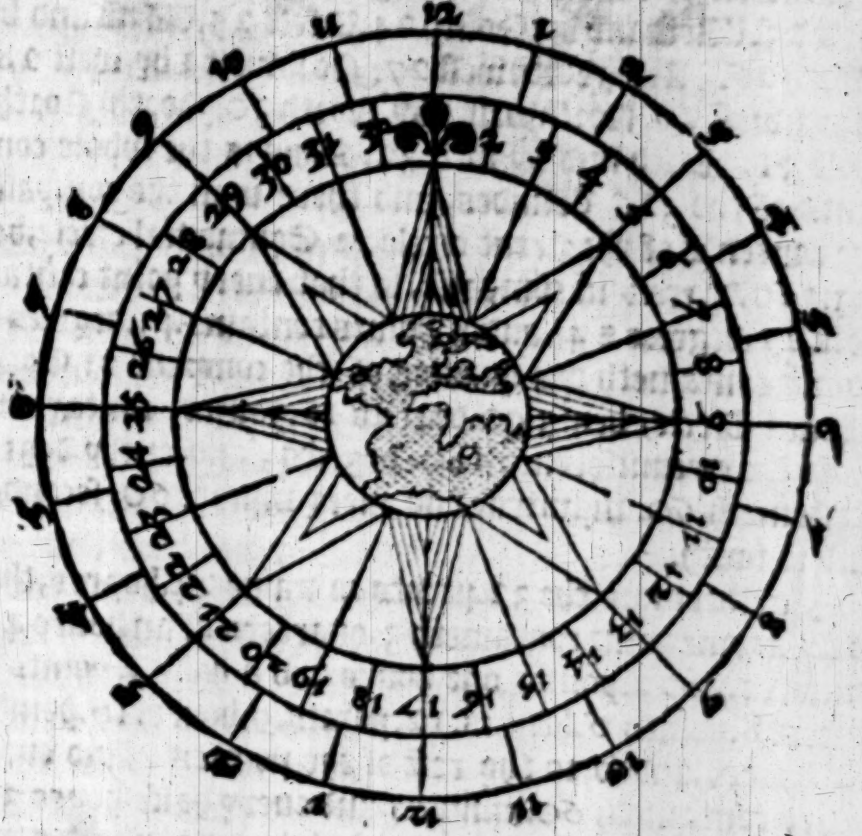
by eight capitall or head windes or points, whereof foure of them are called Cardinalles, and haue theyr names properly of themselues, and the other foure of them, are derined or take their names of the other foure, as this: South commeth directly from the Meridian, and North is directly against it, & East commeth from the Equinoctiall point, towards the partes of the Sunne rising, and West is right against it. Northeast is in the midwaye betwæne the East and the North, and Southeast in the midway betwæne the East and the South, and southwest betwæne the West and the South, and Northwest is in the middle betwæne the North and the West. And then there be eight inferior points or windes, halfe way betwæne euery one of those eight capital or head points or windes, & those haue the names of the two points that he standeth betwæne, as that point that standeth betwæne the North and the Northeast, is called North Northeast, and that point betwæne the East and the Northeast, is called East Northeast, & also that point that is betwæne the East and the Southeast, is called East Southeast. And so forth vnto the rest of ỳ eight points, whose names doth folow, as South southeast and South southwest, and West southwest, and West Northwest, & North Northwest: & now betwæne euery one of these inferior points, and euery one of the head windes there is a by-point or wind, and he is called a by-point, for that he is not named but by the name of one of ỳ head points nert adioyning. There be 16. of them in number, so that there be eight capitall or head points, and eight inferiour points, and 16. by-pointes or windes, so that in all there be 32. of them. The vse of these pointes is, to direct the shippe to what quarter of the world you doe assigne, to kæpe that course, to finde the place so assigned, for that the propertie of the Nædle or Flie, is alwayes to stand due South and North.

Eight inferior points or windes.

16. by-points or windes.

Additions.

As



As touching Nauigation, for the instructions of the meanest, I haue set this figure or Compasse, where first is to be noted the 32. windes and points of the compasse aboue made. The Flouredeluce is the first point, and these be the names beginning at the North, & so with the course of the Sunne, according vnto the common order that sea-men doth teach or instruct their youth, which is this. North 1. North and by East 2. North Northeast 3. North east and by North 4. Northeast 5. Northeast & by East 6. East Northeast 7. East & by North 8. East 9. East & by South 10. East Southeast 11. Southeast & by East 12. Southeast 13. Southeast & by South 14. South Southeast 15. South & by East 16. South 17. South & by West 18. South southwest 19. Southwest & by south 20.

The names of the 32. points of ỹ Compasse.

Southwest 21. Southwest & by west. 22. West Southwest 23. West and by South 24. West 25. West and by North 26. West Northwest 27. Northwest & by west 28. Northwest 29. Northwest & by North 30. North Northwest 31. North and by West 32. This is the whole contents of the 32. Windes, and there is in the compasse the contents of the great circle, or Equinoctial circle, being 360. degrees in compasse, so that euery point containeth 11. degrees & 4¼. and 4. points contains 45. degrees 8 points containeth one quarter of the compasse or Equinoctiall Circle, being 90. degrees 16. points, containeth halfe the circumference 180. degrees, and euery degree containeth 60. minutes, and euery minute 60. seconds, and so forth.

The cõtents of the Equinoctial circle.

360 degrees one point of ye Compasse containeth 11 degres & a quarter.

Furthermore, the 32. points containe 24. houres, that is to say, one point containeth 3. quarters of an houre 45. minutes. And 2. points one houre and a halfe. 4. points 3. hours. 8. points 6. houres. 12. points. 9. hours. 16. points. 12. houres, and so to the rest of the pointes. And euery houre containeth 60. minutes, and euery halfe houre 30. minutes, and euery quarter of an houre 15. minutes, and after that rate 45. minutes maketh three quarters of an houre.

The 32. points brought into 24. houres.

¶ The second Chapter treateth of the Golden number or Prime, shewing the Epact, and by the Epact, to know the age of the Moone.

IT is necessarie and conuenient for the seafarung men, to know the Prime or golden number: for by the golden number is knowen the Epact, and the Epact sheweth the age of the moone or change day, within 12 houres vnder or ouer: and by the age of the moone, you may know at what a clocke it doth flow in any place that you do know what moone doth make a full Sea: therefore it is meete to know the Epact, and that is knowen by the Prime, or Golden number. The cause why it was called the golden number, was because it was sent out of Aegipt in letters of golde, to the Romanes or Citie of Rome.

The cause why that it is called the Prime, was for that it was the first order that the moones course was knowen by, & it is thus knowen. Adde one to the yeere of our Lord that you would know the Golden number or Prime of, then deuide the number by 19. the remainer is the Prime: and multiply that by 11. and loke what the number commeth vnto, deuide that by 30. the remainer is the Epact. Then when you haue once the Epact, adde 11. to your Epact for euerie yeare more, and loke what that commeth to, that is your Epact: and if it do passe 30. put that away, and keepe the remainer for your epact. And thus this rule will serue for euer, sauing when the Prime beginneth at one, for then the Epact is 11. & then do (as aforesaide) as you may perceiue by this table heere following.

The cause why it was called the Prime or Golden number.

To knowe how many the Epact is.

¶ The Table of Prime and Epact

for xix. yeeres and when those xix. yeeres be ended, then beginne againe, & so it will serue for euer, &c.

The yere of the Lorde	Prime.	Epact.	The yere of the Lorde	Prime.	Epact.
1579	3	3	1589	13	23
1580	4	14	1590	14	4
1581	5	25	1591	15	15
1582	6	6	1592	16	26
1583	7	17	1593	17	7
1584	8	28	1594	18	18
1585	9	9	1595	19	29
1586	10	20	1596	1	11
1587	11	1	1597	2	22
1588	12	12			

The Prime is the time of 19. yeeres

THe Prime or golden number, is the time of 19. yeeres, in the which time the Moone maketh all her chaunges or coniunctions with the Sunne, and when these nineteene yeeres be expired, then she beginneth againe: as for example. This yeere beinge the yeere of our Lord. 1579. she chaunged the 26. day of March, and euerie yeere doth alter 11. daies of her change till the yeere 1598, and then she changeth the said 26. day of March again, as I shewed you before: the epact is the putting to 11. for euery yere. Now furthermore to know the age of the Moone, do thus. take ỳ number of ỳ Epact for your yere (beginning at March alwaies) & reckē how many months it is from March, (coũting March for one) then

then recken how many daies of ẏ moneth it is, in which you would know the age of the Moone: Then put all your number together, (that is to say, yours Epact, your moneth from March, & euerie day of the Moneth) then loke how many it amounteth vnto, that is the age of ẏ Moone, but if it passe 30. throw all the 30. away, and keepe that which will not be 30. for when the age of the Moone is iust 30. then is it the change daie: and if it be the fiftenth day of the age of the Moone, then the Moone is at the full. When the age is betweene seuen daies and eight, then is the first quarter. And if it be 22. daies old, then the Moone is at the last quarter: as for example, this yeare. 1579. I loke and finde the Epact 3. for the yeare: now I woulde know the age of the Moone the 13. day of June. Now I recken how many moneths it is frō March, reckening March for one, and I find it is foure moneths: thē I take and adde all these together, that is to say 3. for the Epact, and foure for the moneths (that is to say, March, Aprill, May, Iune,) and then 13. for the daies of the moneth, and all commeth to 20. So that you may conclude, that the Moone is 20. dayes olde, & was at the full 5. dayes before.

To knowe the age of the Moone, by the number of the Epact.

¶ The third Chapter treateth how to know by the age of the Moone, what houre it doth flow, or is full Sea at any place, where you doo know what Moone maketh a full Sea.

Now by the age of the Moone you may know at what houre it is a full sea in any place where you doe knowe what Moone maketh a ful sea, which rule commonly the sea men call, the shifting their Sunne and Moone: & many waies there be to doe it, for thus they may do it: let them diuide one houre into fiue parts, & then take foure of those parts, and put the fift part away, that serueth for the alteration of 24. houres, & the foure fift parts of an houre are 48. minutes, & the fift part of an houre is 12. minutes

To knowe the alteration of the tides.

in 24. houres.

A flood and an ebbe doth after 24. minutes forwards: as thus for example: it floweth 12. of the clocke at the lands end, vpon the chaunge daie, the Moone being in the south, at all times a full sea. The moone being one daye olde, it floweth 12. of the clocke 48. minutes. 2 dayes olde, it floweth one of the clocke 36. minutes, three dayes olde, it floweth 2. of the clocke. 24. minutes: foure dayes olde, it floweth 3 of the clocke, 12 minutes: fiue dayes olde, it floweth 4 of the clocke iust fiue dayes olde, it floweth 4. of the clocke, 48. minutes: seauen daies olde: fiue of ỳ clock 36. minutes, eight dais olde, 6. of the clock 24. minutes: nine daies olde, seuen of the clocke. 12. minutes: ten daies olde, it floweth 8. of the clocke iust: eleuen daies olde 8. of the clocke 48 minutes 12 dayes 9. of the clocke. 36. minutes: 13 daies old. 10 of the clocke. 24. minutes. 14 daies old, it floweth 11. of the clock. xii. minutes, xv. daies old, it floweth xii. of the clocke iust, then being the full moone: & so begin a gaine as you did before at one day olde, and so forth. For the course of the tides is nothing else but to adde for euerie day of the age of the moone an houre, pulling backe the fifth part of an houre (being xii. minutes) and by this account, you may at all times know at what a clock it doth flow, by putting to euery flood and ebbe xviii. minutes, & to 2. flouds and 2 ebbes, putting to 48. minutes.

An ensample for the full Sea vpon the landes ende for euerie day of the age of the Moone.

To shifte the Sunne and the Moone by the points of the compasse.

Now furthermore, the seamen vse to make their account by this meanes (but it is all one) they do allow for euery day of the age of the moone, one point & three minutes: for a pont of the compasse containeth 45 minutes, that is 3 quarters of an houre. Then they put 3. minutes to 45. minutes, which maketh 48, minutes, the said 3 minuts is the xv part of a point, & from the chaunge to the full is xv. dayes, so ỳ (the halfe cõpasse being xvi. points) they breake the odde point into xv. pares, & ỳ commeth to 3. minutes, so ỳ the alteration of the tides, for euery xviii. hours be 48. minutes, or the 4. fifth partes of an houre. Wherefore

there

there shall folow a table of tydes, about certaine places of this realme: for euery mone containeth xxix.daies xii. houres 44.minutes frō change to change: the whole contents of the houres of the mone, be 708 houres, and 44 minutes. And there is in euery yere xii.chaunges of the mone: & the yere conteineth 365 daies, 5 houres, 55 minuts, xii secōds. Yet some do affirme to be odde 6 houres, but there lacketh 4 minutes 47 seconds in the tropicall yere. Likewise in the yere be xii moneths agreeable to the xii.mones: the xii.mones containe but 354.daies, so that there be xi.daies more in the yere, than there be in the xii.mones. The yere also is deuided into xii.moneths, which moneths haue taken their names at the will & pleasure of men: as first Januarie was so called of Ianus, because of two heads: for the month of January beholdeth the ende of the yere past, & the beginning of the yere to come. Februarie toke his name of certaine Romane sacrifices, called Februa. March is so called of Mars, for Romulus so named it after his father. Aprill comes of Aperio, because that then the earth is opened. May, of Maia, the mother of Mercury. June so called by preparing to the war. July, of Iulius Cæsar: & August, of Augustus Cæsar, for in that month he entred the Consulship: then the rest of ỹ months toke their names of their number frō March Now these xii.months which maketh the yere, the sunne doth passe or go through the Zodiack called the xii signes, which is the occasion of ỹ yere: for this is to be noted, ỹ the sunne, as I said before, doth go by his natural mouing in 365.daies, 5.houres, 55.minuts, xii.secōds, through the Zodiack, cōtaining 360.degrees, his course being against the xxiiii.houres, going frō the west into the East, against the course of primum mobile, or first mouer, being moued by the mightie prouidence of God, which maketh the 24. houres: & so doth all the 7.lights or planets, (except) that it be in their retrogration: but the sunne and the mone

The cōtēts of the number of daies & houres in one Moon: ỹ houres in euery Mone be 708.44. minutes.

The contēt of a yeere is 365.daies.5. houres, 55 minutes.

How ỹ mōneths toke their names

The Zodiacke contayneth 360.degrees.

The mouing of 24 houres

be

The time ỳ the Moone goeth thorow the 12 Signes.

be neuer retrogate, as the other fiue planets or lights be. And this is to be noted, that the Moone goeth faster then the Sunne, for she goeth through the whole Zodiacke, in 27. dayes and eight houres. Now in that same time the Sunne is remoued by his natural moouing from that place of the Zodiacke neere 27. degrees: and then because that the Moone hath not found the Sunne there, it is two dayes, foure houres, and foure and fortie minutes more, before that the Moone ouertaketh the Sunne again, so by that meanes, it is 29. dayes, twelue houres, and foure and fortie minutes betweene the chaunge of the Moone, and the next chaunge, one Moone with another, throughout the yeere, although that the Moone may chaunge sometime in lesse time, and sometime in longer tyme, that is by the meanes of the three motions of the Moone, that is to say, her swift motion, and her middle motion, & her slow motion, which groweth by the meanes of the Moones Auge or opposition thereof. The Moone being in Auge, goeth but little more then twelue degrees in foure and twenty houres. And in the opposition of Auge neere 15. degrees in 24. houres, and in her middle or equal motion 13. degrees 12. minuts. So this is the occasion why sometime the Moone may chaunge sooner or be detracted longer then the tyme of 29. dayes, 12. houres, and 44. minutes. This point of Auge is moueable, and doth passe throughout the Zodiacke in the tyme of 19. yeeres: and it causeth sometime the full of the Moone to happen sooner and later. In like manner also the quarters of ỳ Moone with all the other aspects that the Moone hath with the Sunne, or any other of the Planettes according to the Moones motion. In like manner (by the meanes of the 3. motions of the Moone) sometime the Moone goeth more then one point and 3. minutes, in 24. houres, & sometimes lesse then one point and 3. minutes, as this for example: the Moone being in her slow motion, goeth but little more then

The three motions of the Moone.

Of Auge.

The cause why ỳ Moon changeth rather or later.

The Moon goeth in 24. houres sometimes.

then 12. degrees in 24. houres, and then the sunne in that time doth go one degree: and then is there but 11. degrees betweene the sunne and the moone, (that is but 44. minutes.) So that the moone is not one point in 24. houres from the sunne. But being in hir swift motion she goeth neere 15 degrees in 24. houres, and the sunne goeth one degree in that time: so that there is 14. Degrees in xxiiii. houres, betweene the moone and the sunne, (that is 56. minutes) which is a point, and 11. minutes. Wherefore I do thinke it verie necessary for to show somewhat of the moones motion, that they may knowe when that the moone is either in hir swift motion or her slow motion, for that I do know that there is not in respect, no seamen that doth knowe it. For that I do know no one seaman that hath any sight or knowledge in the moones Theorar, therefore let them note these few words following.

more degrees, and sometime fewer degrees.

The Moone is not one point asunder from the Sunne in xxiiii. houres Addition.

When that the Prime is one, then the point of Auge is in the first part of Aries, then the moone being there, she is in her slow motion. So in like manner the moone beeing in Libra, in her swift motion for that it is the opposition of the moones auge, and so in the time of 19. yeares, the point of auge doth go through the 12. signes. So that in 9. yeares and a halfe, the poynt of Auge is in Libra, and then the moone being in Aries, she is in her slow motion, going about 12. degrees in xxiiii. houres. So that then the moone being in Libra, she goeth xv. degrees, in xxiiii. houres, for that there is the opposition of auge. And also when the Prime is five, then the point of auge is in Cancer, and then there being in hir slowe motion. So that when that the moone is in Capricorne, then in hir swift motion. And when the Prime is viii. or xv. then the moones auge is in Capricorne, and then there the moone is in hir slow motion, and also in Cancer her swifte motion. And this by considering what that the

Prime is, you may know where that the Mone Auge is, which is very necessarie for seamen for to knowe in diuers respects. For if that the mone doth come from her swift motion, then it causeth the chaunge, quarter, or full of the mone to be the rather. But contrariwise, when that the mone commeth from hir slow motion, then that doth detract the time the longer before the Mone doth chaunge, or is at the full or any other aspect.

The Moone is in xxiiii. houres .r. point and 11. Minutes asunder from the sunne Errour of Mariners.

And thus much I haue saide of the mones motion: for that some seamen will take vpon them to correct the Almanackes as touching the chaunge and quarters of the Mone: holding this opinion, that euery Mone ought to be equal in the number of the daies and houres: & the full Mones to be iust the halfe contents. And the quarters in lyke manner, the iust fourth parte in dayes and houres, so that some of them will take vpon them to tell (by the rule of the Epact, (the true houre of the change, quarters, and full of the Mone. Wherein they are notably deceiued.

Againe, sometime in the yeere you shall see the Mone rather then at some other time, as this for example. Frō Januarie to June, you shall see the Mone within xviii. houres after the change, because she hath North declination of the Sunne, and maketh a bigger Arche than the sunne. From July to December, you shall not see the Mone three dayes after the chaunge, because her declination is to the south part of the sunne: but you maye see hir in xviii. houres before her chaunge. Now the Seamen do imagine a Prime day, which is the halfe quarter of the Mone: that is, when the Mone is 3. dayes and 18. houres old, (the Mone being then 4. points to ỳ eastward of the sunne, which is three houres:) the same rule may they in like case obserue when the Mone is past the full three dayes and 18. houres and also in the middes of the quarters.

Heere

Heere foloweth a Table of Tides.

FIrſt, the Wone South or North, on Landes ende full ſea.

The Wone South and by Eaſt, at the Goze end full ſea.

The Wone South ſouthweſt, betweene holy Iland & Tinemouth, full ſea.

It floweth betweene Tinemouth and Flambrough head, ſouthweſt and Northeaſt Wone.

It floweth betweene Flambrough head, and Bridlington in the Bay, a ſouthweſt and by weſt Wone.

The Wone in the weſt ſouthweſt, betweene Bridlington and Laurenas, full ſea.

It floweth betweene Laurenas & Cromer all along the well: and Eaſt and weſt wone.

It floweth betweene Cromer and Yarmouth Rode, to Layſtow North Rode, a ſoutheaſt wone.

It floweth betweene Laiſtow Rode and Orfordenas, a ſoutheaſt and by ſouth wone.

It floweth betweene Orford & Orewell waues, a ſouth ſoutheaſt wone.

It floweth betweene the Nas and the Ware head of Colne, a ſouth and by Eaſt wone.

It floweth at the Spittes, and at the Sheue, and all alongſt the Swinne, a ſouth wone.

At the weſt ende of the Noze, a ſouth and by weſt wone, full ſea.

It floweth at Graueſend, a ſouth ſouthweſt wone.

It floweth at London bridge, a ſouthweſt wone.

It floweth at the North Foxlande, a ſouth ſoutheaſt wone, and ſo alongſte the Coaſt till you come to Bechey. And in the Offing from the North Foxlande to the ſouth Foxland, it runneth halfe tide. And from the ſouth.

Foreland to the Nas, the tide runneth halfe tide halfe quarter. And from the Nas to Fairely, it runneth halfe tide: and from Fairely to Beche, it runneth quarter tide vnder other.

It floweth to the Westward of Beche, a kenning, a Southeast and by South moone.

It floweth at Portesmouth, a south and by East Moone

It floweth at S. Elens a south southeast Moone.

It floweth on the sea side of the Iland, a southeast and by south Moone: and so on the land, and at the Nædles, and runneth quarter tide in the Offing.

It floweth at Pole in the Hauen: a southeast Moone.

It floweth at Waymouth: an East and West Moone.

It floweth at Portland: a southeast moone.

It floweth from the West part of Portland, till you come into Plimmouth, an East and West moone.

It floweth on the shore from Plimmouth to the Lyzard: a West and by south moone. And in the Offing a southeast moone.

It floweth at Mounts Baye: an East and West moone.

It floweth at Selly: a West and by south moone.

It floweth at the Landes ende of Golfe: a West south west moone.

It floweth all alongst the coast vp to Brikkow, and the coast of Ireland, from Waterford to Kinsale, a west and by south moone.

Farthermore it floweth (for the most parte) from the Poll head of Burdeaux all alongst the coast of Biskey, Galyza, Portingale, till you come to the straightes of Maliga, a southwest and Northeast moone.

It floweth at Flushing, a southwest and by south moone.

It floweth at Antwarp, an Eaſt and Weſt Wone.

It floweth all alongſt the coaſt of Flanders, from the Wildings to Calys, a South and by Eaſt Wone: & ſo runneth halfe tide vnder the other.

Now here is one ſpeciall thing to be noted, and that is this: It floweth one point of the Compaſſe more in the ſpring ſtreames, then it doth in any of the quarters of the Wone, (ſo that it be a Ryuer where there is any indraft, hauing diſtaunce from the Sea) when there is neither rage of windes, nor any cauſe either to hinder or further the ſaid effect.

It will flowe a point of the compas more in the ſpringe tides than in the neepe tides in a riuer that hath any diſtance vnto the Sea.

As for example, thus: It floweth at Graueſende at the chaunge of the Wone or full, a South Southweſt Wone. But in any of the quarters of the Wone it ſcant floweth, a South and by Weſt Wone: and this is generall for euer.

¶ The fourth Chapter treateth of the Sunne and Moones courſe in the Zodiacke: and how you ſhall know what houres the Moone ſhall riſe and ſet at: and at what point of the Compaſſe: with other neceſſarie thinges.

Furthermore, the ſunne (by his naturall moouinge through the twelue ſignes in the Zodiacke, in the yeere) doeth cauſe the height and lowneſſe of his Declination: which is neceſſarie for the ſeafaring men to knowe, in which Declination they doe take from Equinoctiall to Equinoctiall: and this is to be noted, that as the ſunne hath declination, ſo in like manner hath the Wone, for by hir declination and the ſun is knowen the time of hir ſhining or abiding aboue our Horizon. The Sunne or Wone in the firſt minute of Aries, doe

To knowe how long the Mone ſhineth.

rise East, and set West, and shine xii. houres. In the first minute of Taurus, they rise neare the East Northeast, & sette nære the West Northwest, and shine somewhat more then viii. houres. In the signe of Gemini, they rise nære the Northeast and by East, and they set nære the Northwest and by West, and shine nære xvi. houres.

In the signe of Cancer, the first minute, they make theyr greatest declination to the Northwards, and they ryse neare the Northeast, and sette nære the Northwest, and shine nære xvi. houres and a halfe. In the first minute of Leo, (descending towards the Equinoctiall,) as they did in Gemini. And in the signe of Virgo, as they dyd in Taurus. And in the first minute of Libra, Equinoctiall: beginning South declination, as in Aries. And in the first minute of Scorpio, they rise nære the East Southest, and sette nære the West southwest, and shine ten houres.

In the first minute of Sagittarius, they rise nære the southeast and by East, and sette neare the Southwest and by West, and shine viii. houres. In the first minute of Capricornus, they haue their greatest declination to ỹ south, and begin to returne to the Equinoctiall, rising nære the southeast, and setting nære the southwest, and shine vii. houres and a halfe. In the first minute of Aquarius, as in Sagitarius. In the first minute of Pisces, as in Scorpio.

To know what houre or point the Moone ryseth or setteth.

Now by this rule you may know the rising and setting of the Moone for euer, as thus. I haue shewed you before in the shifting of the Sunne and Moone, for that euerye daye of the age of the Moone, the Moone goeth Eastwarde one point and three minutes: in two dayes two pointes and fire minutes, &c.

Now when you list to know the very houre and time of her rising: Loke how many dayes the Moone is old, then put so many points and so many 3. minuts, & loke what it amounteth vnto. But or euer I say any more in those matters, here is one speciall thing to be noted, ỹ is, when that

that the Mœne doth chaunge, & then the mœne & the sun be both vnder one lyke degrée and minute of any signe of the Zodiack. The full mœne is when the sunne and the Mœne be opposite (the one being directly against ỳ other & iust 6. signes asunder) as you may perceiue at the full Mœne: for then when the mœne riseth, the sunne setteth: & when the sunne riseth the mœne setteth. The quarters be, when the sunne & mœne be iust 3. signes asunder (that is, iust 90. degrées.) Now when you list to know the verie time of the Mœnes rising or setting, loke in your Kalender, what signe and degrée the mœne is in: then according to ỳ rule of the shining, diuide that into two equal parts then frō the south, so shall you sée at what houre ỳ mœne riseth, as for example this. In March alwaies the sunne is in Aries, then the mœne being in her first quarter, then she is 6. houres to the Eastward of the sunne, then the Mœne must nédes be in Cancer. Then shineth the mœne in our Horizon 16. houres and a halfe, then the mœne is south at 6, of ỳ clock, then she shineth 8. houres & a quarter after 6. of the clocke. So ỳ she setteth at 2. of the clock & a quarter of an houre past, then she riseth in the day 8. houres & a quarter before 6. of ỳ clocke, that is, at 9. of the clock, & 3. quarters of an houre past. Now at ỳ last quarter in March, then the mœne must nédes be in Capricornus, then shineth the Mœne but 7. houres & a halfe, then ỳ mœne is south at 6. of the clocke in the morning, then the mœne riseth iii. houres & iii. quarters before, ỳ is, at two of the clocke & a quarter of an houre past in ỳ morning, then she setteth by day at 9. of the clocke, & 3. quarters of an houre past, & this rule will serue for euer, without any great errour. But yet there is a further matter for ỳ exact doing, which is the latitude of the Mœne from the head or taile of the Dragon.

Of the chaunge.

Of the full Moone.

Quarter of the Moone.

Ensample of the Moones rising and setting.

The Moone hath Latitude.

And now for to shew vnto you when that the Mœne is with the head and the taile of the Dragon, as I haue in the

the third Capter saide vnto you, there is but feue seamenne that doth knowe the mones Theorar, for that they cannot tell when that the mone is in her swifte motion, or slowe motion. So in like manner it is necessarie for to knowe the Mones Latitude from the lyne Ecliptick, and also of which side of the line Ecliptick, which is knowen from the head or taile of the Dragon. For when that the mone hath passed nintie degrees from the heade of the Dragon, then the mone hath Latitude fiue degrees vnto the North partes of the lyne Ecliptick, and also if that the mone be 90. degrees from the Dragons taile, then the mone hath Latitude fiue degrees vnto the south partes of the line Ecliptike. So that the Dragons head is no other thing, but the crossing or passing of the Mone from the south parts vnto the North part of the lyne Ecliptick. So in like manner the Dragons taile is the crossing or passing of the mone ouer the line Ecliptick from the North parte vnto the south partes of the line Ecliptick. The effects of that is, if that the mone doth come with the head or tayle of the Dragon at her oppolition or full, that then the mone shall be eclipsed, for that then the shadowe of the earth is seene vppon the mone, and these eclipses be generall thorowe the face of the whole earth, so that the mone is aboue the Horizon. And in like manner, if that the mone doth come with the head or tayle of the Dragon at the coniunction or chaunge of the mone, then the sunne is eclipsed, for that the mone commeth betweene the sunne and the earth, but these Eclipses are not generall, for that the Diameter of the Earth is more then fiue times the Diameter of the mone: and also the mone commeth verie neere vnto the earth in respect of the great distance that the sunne is from the Earth, so that the sunne may be eclipsed in one place but not in another, which doth happen by the Mones Paralex, as afore I haue

shewed

shewed &c. And now for to know wher the Dragons head is, note this, when that the Prime is one, then the Dragons head is in the first part of Aries, as the point of augue is. But now their motions is contrary: For as the point of Auge is in Aries, and so commeth into Taurus, and so proceading through the xii. signes in 19. yeres. So the Dragons head doth passe through the 12. signes in 19. yeres backwards, as being in Aries, so it commeth into Pisces, and so into Aquarius, &c. So that in 9. yeres and a halfe, the Dragons head is in Libra, and doth mete with the point of Auge, &c.

And now for to know the Mones Latitude, marke this, the Prime one, the Dragons head is in Aries, so that when the Mone is in Cancer, then she is 90. Degres from the Dragons head, and then the mone hath her farthest distance from the lyne Ecliptick, that is fiue Degres. So that the Mone doth decline fiue Degres more vnto the Northwardes than the sunne doth. So that the mone doth decline in all xxviii. Degres and a halfe from the Equinoctiall, and so when that the mone doth come towards the Dragons tayle, which is alwaies opposite vnto the Dragons head, the Prime one, the Dragons tayle is in Libra. So the mone passing Cancer, the mone commeth nearer the Ecliptick. So in Libra, the mone crosseth the lyne Ecliptick, and then when that she is come into Capricorne, then she is fiue degres vnto the Southwardes of the lyne Ecliptick, and then she declineth 28. Degres and a halfe vnto the Southwardes of the Equinoctiall. So that the mone dothe decline in all, medling not with the mones Paraler, 57. degres, the Prime being one, and so in nine yeres and a halfe, the Dragons head shall be in Libra, and the taile in Aries, and then the mone in the signe of Libra, shall passe ouer the lyne Eclypticke from the South parte to the North part. So that the mone in the signe of Ca-

pricorne, is fiue Degrees vnto the North of the lyne Ecliptick, and then the doth decline but xviii. degrees and a halfe from the Equinoctiall to the South parts, and so in the signe of Aries, the moone shall passe ouer the lyne Ecliptick from the North vnto the south and then in Cancer, the moone is fiue degrees vnto the south of the lyne Ecliptick, and doth decline xviii. Degrees vnto the North parts of the Equinoctial, so that the moones whole declination, is but 37. Degrees. So when the Prime is one, the declination of the moone is more by xv. Degrees, then when the Prime is betweene nine and tenne yeares, and when the Prime is neare fiue, then the Dragons head is in Capricornus. And when the Prime is foureteene or fifteene, the Dragons head is in Cancer. So ỳ in xix. yeares the Dragons head doth passe through the twelue signes backwards. And this by knowing what the Prime is, you maye knowe wher the Dragons head is, and also the Dragons tayle, and then that knowne, you maye knowe the moones Latitude from the line Ecliptick, and of which side: For the Moone with the Dragons head, then she palleth ouer from the south vnto the North part, and the Moone with the Dragons tayle then she palleth ouer from the North vnto the south part of the lyne Ecliptick, and then when ỳ the Moone is halfe way betweene the head and the tayle of the dragon, then the moone is fiue degrees in latitude from the lyne Ecliptick, if that she come from the head of the Dragon then on the North side, if from the taile, then on the south side of the line Ecliptick, and this I doe thinke sufficient for instruction.

Yet there is one thinge which I would sea-faring men should consider, although a great number bee expert in that, yet it is meete to bee spoken of, as this. The sunne being in Cancer, or Moone in lyke manner,

or in Gemini, or any time when the sunne or moone hath North declination, they will set their Compasse before them, and when they see the sunne giue an East shadowe, they will saie that it is fiue of the clocke, which and if the sunne be in Cancer, it is not much past fiue of the clocke, and the more to the southwardes, the more they doe erre.

You cannot knowe what a clocke it is by the compasse, the Sunne being in the North signes.

And in lyke case the Moone beeing in Cancer, when they do see the moone giue an East shaddowe by their Compasse, they will saie the moone is West, but they doe not consider, that the sunne and the moone beeing in Cancer, commeth so neare our Zenith or Verticall point right ouer our head, which is the verie height of their declination, comming so neare them, therefore they must iudge the East or West from the Pole or North starre, if they will iudge truely.

The throw of the shadow of y Moone

Wherefore I doe much commende the Equinoctiall dyalls for the exact truth, for they cannot know the truth by their Compasse, so that the sunne or moone, or anye other starre, haue any great declination, being in Cancer: and you must consider this in lyke manner. The sunne hauing North declination, the further you doe goe to the Northwardes, the longer is your daie, and the shorter is your night, & towards the southwards, the shorter daies and longer nights.

The east-nocthall dyall is be very good.

Now contrariwise, the sunne hauing south declination, the more to the Northwardes, the shorter dayes and the longer nightes, the further to the Southwardes, the longer dayes and shorter nightes, and vnder the Equinoctiall, the nightes and dayes all one, what declination so euer the sunne hath: but this rule that I haue giuen you is for London, or any other place that hath that Latitude or eleuation of the Pole Artiche at 51, or 52. degrees.

As touching the length and shortnesse of the day and night

¶ The fiſt Chapter is of a Table of declination, commonly called of Sea-faring men, A Regiment of the Sunne, exactly calculated for foure yeeres, and will ſerue for 24. yeeres, for euery day of the moneth.

AND in lyke manner as I haue ſaide ſomewhat of the mones motion, ſo I do thinck it conuenient for to ſay ſomewhat of the Sunnes motion, for that it is neceſſarie for ſea-men for to know, the ſunnes place in the Zodiacke, whereby that they may calculate or count the ſunnes declination truely, as I haue ſhewed before, that the ſunne doth paſſe thorough the Zodiacke in 365. daies. 5. houres. 55 minutes, 13. ſeconds, and hath three motions as the mone hath. In the point of auge is the ſunnes ſlow motion, and then the ſunne paſſeth or goeth but little more than lvii. minutes in 24, houres, and in the oppoſition of auge, the ſunne paſſeth or goeth one degree and neere 2. minutes in 24 houres, that is more by nerer fiue minutes in her ſwift motion than in the ſunnes ſlow motion. The point of auge is now in this age of the worlde in the ſigne of Cancer, but not in the ſolſtitiall point, when ỹ the ſunne hath his greateſt declination, and alſo the oppoſition of auge is in Capricorne, but not when the ſunne hath his greateſt declination. Now by the meanes of the three motions of the ſunne, it cauſeth this, that the Equinoctiall points be not euen, for that there is more dayes from the equinoctiall of March vnto the equinoctiall of September, by neere nine dayes, then that there is from the Equi-

Equinoctiall of September, vnto the Equinoctiall of March, for that there is from the eleuenth day of March vnto the xiiii. day of September, 187. dayes, and there is but 178. dayes from the xiiii. day of September, vnto the xi. day of March. And the reason is this as I haue saide before, that the latter part of June that the sunne is in his slowe motion, and also in the latter parte of December, the sunne is in his swifte motion: and this I doe thinke sufficient for instructions in this matter, for that the sea-men hath no farther to doe with the sunnes motion, but onelye from the true place of the sunne to seeke the true declination of it. And also the most part of seamen haue vsed Spanish Regiments, and thinking that those woulde haue serued for euer, which is most contrarie, for if that it bee neuer so truely calculated, yet it groweth after xviii. yeare vnto errour. For as often as euery yeere of Bissextus doth come about, which is euerie foure yeere, the sunne is rather vppon the Equinoctiall by more then halfe an houre, &c.

Nowe shall followe a Table of declination or Regiment for foure yeeres, beeing calculated for Englande, and will serue all Europe without much errour, or any other Countrie or place that hath our Longitude, as the most part of Africa, as Ginnie, and those partes to the Southwardes, as farre as the Antarticke Pole serving for euery daye of the moneth, very necessarie for them that doe vse to trauaile either by sea or by Lande, and is one of the principall points in Nauigation, for long voyages, and the cause why I haue written this Regiment for the Sea, or Tables of Declination, is for that I do knowe that euerie parson that goeth vnto the sea, as master of a Shippe, hath not capacitie to calculate the sunnes declination, by the place of the sunne, although they haue the Tables of Declination, as the

Euery person cannot calculate the Sunnes declination

Ephemerides, or Martin Curteise, otherwise called the Art of Nauigation. Wherefore I haue written these notes, and Regiment or Table of declination for foure yeares, and the first rowe towards your left hand, is the dayes of the moneth: the nert rowe is the degrees of declination that the sun hath at the instant time of none: and the third row is the odde minutes of declination belonging to the degrees.

Two times in the yeere the Sunne hath declination 1577.

Now there be two times in the yeere that the sunne hath no declination, as this. For the first yeere after Bissextilis, (which was in the yeere of our Lord. 1577. the 11. day of March, at foure of the clocke in the morning) the sunne was vppon the Equinoctiall beginning North declination. And in like manner the 13. daye of September at none, the sunne was vppon the Equinoctiall beginning South declination, and also the second yeere after Bissextilis, which is the yeere of our Lord. 1578. the sunne is vppon the Equinoctiall 11. day of March, betweene 10. and 11, of the clocke before none, beginning North declination and in like manner the 13. day of September, at fiue of the clocke in the after none, beginning south declination.

Furthermore, in the third yeere after Bissextilis which is the yeere of our Lords 1579. the sunne is vppon the Equinoctiall the 11. day of March, betweene foure & fiue of the clocke in the after none, beginning North declination, and so in like manner the 13. day of september, at 12. of the clocke at midnight, beginning south declination.

Lastly, in the yeere of our Lorde. 1580. that is, the yeare Bissextilis it selfe. Vppon the tenth day of March, the sunne shall be vppon the Equinoctiall betweene. 10. and 11. of the clocke at night, beginning North declination: and in lyke manner the 13. daye of September, at fiue of the clocke in the morning, beginning south

declination: Nowe these foure yæres bæing expired, you must after the yære Bissextilis, beginne againe at the yære one: as hære doth follow, for example. And so it will serue for nære 20. yæres to come.

Yeere 1	Yeere 2	Yeere 3	Yeere Bissextilis
1577	1578	1579	1580
1581	1582	1583	1584
1585	1586	1587	1588
1589	1590	1591	1592
1593	1594	1595	1596

January.			February.			March.		
	D.	G. M.		D.	G. M.		D.	G. M.
1	21	52	1	14	7	1	3	49
2	21	43	2	13	47	2	3	26
3	21	33	3	13	26	3	3	2
4	21	23	4	13	6	4	2	38
5	21	12	5	12	46	5	2	14
6	21	1	6	12	26	6	1	51
7	20	49	7	12	5	7	1	27
8	20	37	8	11	44	8	1	3
9	20	25	9	11	22	9	0	39
10	20	12	10	11	2	10	0	16
11	19	59	11	10	39	11	0	8
12	19	46	12	10	18	12	0	32
13	19	32	13	9	56	13	0	55
14	19	17	14	9	33	14	1	19
15	19	3	15	9	11	15	1	42
16	18	47	16	8	49	16	2	6
17	18	32	17	8	26	17	2	29
18	18	17	18	8	4	18	2	53
19	18	1	19	7	41	19	3	17
20	17	45	20	7	19	20	3	40
21	17	28	21	6	56	21	4	3
22	17	11	22	6	33	22	4	26
23	16	54	23	6	10	23	4	49
24	16	37	24	5	46	24	5	12
25	16	19	25	5	23	25	5	35
26	16	1	26	5	0	26	5	58
27	15	42	27	4	36	27	6	21
28	15	23	28	4	13	28	6	44
29	15	5				29	7	6
30	14	46				30	7	28
31	14	26				31	7	0

South declination.

South declination. Equino-ctiall.

North declination.

	Aprill.			May.				June.		
	D.	G.	M.	D.	G.	M.		D.	G.	M.
1	8	13		1	17	49		1	23	8
2	8	35		2	18	5		2	23	12
3	8	57		3	18	20		3	23	15
4	9	19		4	18	35		4	23	18
5	9	41		5	18	49		5	23	22
6	10	2		6	19	4		6	23	24
7	10	23		7	19	17		7	23	26
8	10	44		8	19	31		8	23	27
9	11	6		9	19	44	Solstic.	9	23	27
10	11	25		10	19	57		10	23	28
11	11	45		11	20	8		11	23	28
12	12	6		12	20	21		12	23	28
13	12	26		13	20	33		13	23	28
14	12	4		14	20	45		14	23	27
15	13	6		15	20	56		15	23	26
16	13	26		16	21	6		16	23	25
17	13	45		17	21	17		17	23	24
18	14	4		18	21	27		18	23	22
19	14	23		19	21	37		19	23	19
20	14	41		20	21	46		20	23	15
21	15	0		21	21	55		21	23	12
22	15	18		22	22	3		22	23	8
23	15	35		23	22	12		23	23	3
24	15	53		24	22	19		24	22	59
25	16	11		25	22	27		25	22	54
26	16	29		26	22	33		26	22	48
27	16	45		27	22	40		27	22	42
28	17	2		28	22	47		28	22	35
29	17	18		29	22	52		29	22	29
30	17	34		30	22	57		30	22	22
				31	23	3				

North declination.

North declination.

Iuly.

	July. D.G.M.		August. D.G.M.		September. D.G.M.	
1	22	13	1	15 23	1	4 39
2	22	5	2	15 5	2	4 16
3	21	56	3	14 48	3	3 53
4	21	47	4	14 30	4	3 31
5	21	36	5	14 11	5	3 7
6	21	27	6	13 51	6	2 44
7	21	19	7	13 33	7	2 20
8	21	8	8	13 13	8	1 58
9	20	57	9	12 54	9	1 34
10	20	47	10	12 34	10	1 10
11	20	35	11	12 14	11	0 48
12	20	24	12	11 53	12	0 24
13	20	12	13	11 33	13	0 0
14	19	59	14	11 14	14	0 24
15	19	46	15	10 54	15	0 47
16	19	33	16	10 32	16	1 11
17	19	19	17	10 12	17	1 34
18	19	5	18	9 50	18	1 58
19	18	56	19	9 28	19	2 21
20	18	37	20	9 7	20	2 44
21	18	22	21	8 46	21	3 8
22	18	9	22	8 24	22	3 32
23	17	53	23	8 2	23	3 55
24	17	37	24	7 39	24	4 18
25	17	22	25	7 18	25	4 41
26	17	5	26	6 55	26	5 3
27	16	49	27	6 33	27	5 27
28	16	22	28	6 11	28	5 50
29	16	7	29	5 47	29	6 13
30	15	59	30	5 25	30	6 36
31	15	41	31	5 2		

North declination.

North declination.

Equino-

Sol.

ctiall.

South declination.

October.			November.			December.		
	D.	G.M.		D.	G.M.		D.	G.M.
1	6	59	1	17	26	1	23	3
2	7	22	2	17	43	2	23	8
3	7	44	3	17	59	3	23	12
4	8	6	4	18	15	4	23	15
5	8	39	5	18	31	5	23	19
6	8	51	6	18	46	6	23	22
7	9	13	7	19	1	7	23	24
8	9	34	8	19	16	8	23	25
9	9	56	9	19	30	9	23	26
10	10	18	10	19	44	10	23	27
11	10	40	11	19	58	11	23	28
12	11	1	12	20	10	12	23	28
13	11	23	13	20	22	13	23	28
14	11	44	14	20	36	14	23	27
15	12	5	15	20	48	15	23	26
16	12	26	16	20	59	16	23	25
17	12	47	17	21	10	17	23	24
18	13	7	18	21	21	18	23	21
19	13	27	19	21	33	19	23	18
20	13	47	20	21	41	20	23	14
21	14	7	21	21	51	21	23	11
22	14	26	22	21	59	22	23	6
23	14	45	23	22	8	23	23	1
24	15	4	24	22	17	24	22	52
25	15	23	25	22	25	25	22	50
26	15	41	26	22	32	26	22	43
27	16	0	27	22	39	27	22	36
28	16	17	28	22	46	28	22	28
29	16	35	29	22	52	29	22	21
30	16	52	30	22	57	30	22	13
31	17	9				31	22	4

South declination.

South declination.

Solstic.

South declination.

January.				February.				March.			
D.	G.	M.		D.	G.	M.		D.	G.	M.	
1	21	56	South declination.	1	14	12	South declination.	1	3	55	North declination.
2	21	46		2	13	52		2	3	32	
3	21	36		3	13	32		3	3	8	
4	21	26		4	13	11		4	2	44	
5	21	15		5	12	51		5	2	20	
6	21	4		6	12	31		6	1	57	
7	20	52		7	12	10		7	1	34	
8	20	41		8	11	49		8	1	10	
9	20	28		9	11	27		9	0	46	
10	20	16		10	11	6		10	0	22	
11	20	3		11	10	44		11	0	2	
12	19	49		12	10	23		12	0	25	
13	19	36		13	10	1		13	0	49	
14	19	21		14	9	39		14	1	13	
15	19	7		15	9	17		15	1	36	
16	18	52		16	8	55		16	2	0	
17	18	37		17	8	32		17	2	23	
18	18	17		18	8	10		18	2	47	
19	18	1		19	7	47		19	3	11	
20	17	49		20	7	25		20	3	34	
21	17	32		21	7	2		21	3	56	
22	17	15		22	6	39		22	4	20	
23	16	57		23	6	16		23	4	43	
24	16	40		24	5	52		24	5	7	
25	16	23		25	5	29		25	5	29	
26	16	5		26	5	6		26	5	52	
27	15	47		27	4	42		27	6	16	
28	15	28		28	4	19		28	6	38	
29	15	10						29	7	1	
30	14	51						30	7	23	
31	14	31						31	7	49	

Equinoctiall.

	Aprill.			May.				Iune.		
	D.	G.	M.	D.	G.	M.		D.	G.	M.
1	8	9		1	17	46		1	23	6
2	8	30		2	18	1		2	23	11
3	8	51		3	18	17		3	23	14
4	9	14		4	18	32		4	23	17
5	9	35		5	18	46		5	23	20
6	9	56		6	19	1		6	23	23
7	10	18		7	19	14		7	23	25.
8	10	39		8	19	28		8	23	26
9	10	59		9	19	41		9	23	27
10	11	20		10	19	54		10	23	27
11	11	41		11	20	6		11	23	28
12	12	1		12	20	18		12	23	28
13	12	21		13	20	30		13	23	28
14	12	41		14	20	41		14	23	27
15	13	1		15	20	53		15	23	26
16	13	21		16	21	3		16	23	25
17	13	40		17	21	14		17	23	24
18	14	0		18	21	25		18	23	22
19	14	18		19	21	34		19	23	20
20	14	37		20	21	43		20	23	16
21	14	55		21	21	52		21	23	12
22	15	13		22	22	1		22	23	9
23	15	30		23	22	9		23	23	5
24	15	48		24	22	17		24	23	0
25	16	6		25	22	25		25	22	54
26	16	23		26	22	31		26	22	49
27	16	40		27	22	38		27	22	43
28	16	57		28	22	45		28	22	36
29	17	13		29	22	52		29	22	29
30	17	30		30	22	58		30	22	22
				31	23	1				

North declination.

North declination.

Solstic.

July.				August.				September.			
D.	G.	M.		D.	G.	M.		D.	G.	M.	
1	22	14	North declination.	1	15	28	North declination.	1	4	45	South declination.
2	22	6		2	15	10		2	4	22	
3	21	58		3	14	51		3	3	58	
4	21	49		4	14	33		4	3	36	
5	21	40		5	14	16		5	3	13	
6	21	31		6	13	58		6	2	49	
7	21	21		7	13	38		7	2	26	
8	21	11		8	13	18		8	2	4	
9	21	0		9	12	58		9	1	42	
10	20	49		10	12	39		10	1	18	
11	20	38		11	12	19		11	0	56	
12	20	26		12	11	59		12	0	32	
13	20	13		13	11	39	Equino-	13	0	7	
14	20	2		14	11	19		14	0	17	
15	19	55		15	10	58		15	0	41	
16	19	37		16	10	36		16	1	3	
17	19	23		17	10	16	ctiall.	17	1	27	
18	19	9		18	9	54		18	1	51	
19	18	55		19	9	34		19	2	15	
20	18	42		20	9	12		20	2	38	
21	18	26		21	8	50		21	3	1	
22	18	12		22	8	28		22	3	24	
23	17	56		23	8	7		23	3	48	
24	17	41		24	7	45		24	4	11	
25	17	25		25	7	24		25	4	34	
26	17	9		26	7	2		26	4	57	
27	16	52		27	6	39		27	5	20	
28	16	36		28	6	16		28	5	44	
29	16	20		29	5	53		29	6	7	
30	16	2		30	5	31		30	6	30	
31	15	45		31	5	8					

October.				November.				December.			
	D.	G.	M.		D.	G.	M.		D.	G.	M.
1	6	53	South declination.	1	17	22	Solstic.	1	23	2	South declination.
2	7	16		2	17	39		2	23	7	
3	7	39		3	17	55		3	23	12	
4	8	0		4	18	1		4	23	15	
5	8	23		5	18	27		5	23	18	
6	8	45		6	18	42		6	23	22	
7	9	8		7	18	57		7	23	25	
8	9	30		8	19	11		8	23	25	
9	9	52		9	19	25		9	23	26	
10	10	13		10	19	39		10	23	27	
11	10	35		11	19	53		11	23	28	
12	10	56		12	20	6		12	23	28	
13	11	18		13	20	19		13	23	28	
14	11	39		14	20	32		14	23	27	
15	12	0		15	20	44		15	23	26	
16	12	21		16	20	56		16	23	25	
17	12	42		17	21	6		17	23	24	
18	13	2		18	21	17		18	23	22	
19	13	22		19	21	28		19	23	19	
20	13	42		20	21	38		20	23	15	
21	14	2		21	21	48		21	23	12	
22	14	22		22	21	57		22	23	8	
23	14	41		23	22	6		23	23	2	
24	15	0		24	22	15		24	22	56	
25	15	19		25	22	23		25	22	51	
26	15	37		26	22	31		26	22	45	
27	15	56		27	22	37		27	22	37	
28	16	14		28	22	44		28	22	30	
29	16	31		29	22	51		29	22	23	
30	16	48		30	22	57		30	22	15	
31	17	5						31	22	7	

January.			February.			March.		
	D.	G. M.		D.	G. M.		D.	G. M.
1	21	57	1	14	17	1	4	2
2	21	48	2	13	57	2	3	38
3	21	38	3	13	37	3	3	15
4	21	28	4	13	15	4	2	51
5	21	18	5	12	56	5	2	27
6	21	6	6	12	35	6	2	3
7	20	55	7	12	15	7	1	40
8	20	44	8	11	54	8	1	16
9	20	31	9	11	33	9	0	52
10	20	19	10	11	12	10	0	28
11	20	5	11	10	51	11	0	4
12	19	52	12	10	29	12	0	20
13	19	39	13	10	7	13	0	44
14	19	24	14	9	45	14	1	8
15	19	10	15	9	22	15	1	32
16	18	56	16	9	0	16	1	55
17	18	40	17	8	38	17	2	18
18	18	24	18	8	15	18	2	41
19	18	9	19	7	53	19	3	5
20	17	53	20	7	30	20	3	29
21	17	36	21	7	8	21	3	52
22	17	20	22	6	45	22	4	14
23	17	2	23	6	22	23	4	38
24	16	45	24	5	59	24	5	1
25	16	27	25	5	35	25	5	24
26	16	10	26	5	12	26	5	47
27	15	51	27	4	49	27	6	10
28	15	33	28	4	25	28	6	33
29	15	13				29	6	56
30	14	55				30	7	19
31	14	35				31	7	40

South declination.

South declination. Equino-Sci. Ctiall.

North declination.

Aprill.				May.				Iune.			
D.	G.	M.		D.	G.	M.		D.	G	M.	
1	8	1		1	17	43		1	23	5	
2	8	24		2	17	59		2	23	10	
3	8	45		3	18	14		3	23	13	
4	9	8		4	18	28		4	23	16	
5	9	30		5	18	42		5	23	20	
6	9	52		6	18	57		6	23	23	
7	10	12		7	19	11		7	23	24	
8	10	34		8	19	24		8	23	25	
9	10	57	North declination.	9	19	38	Solftic.	9	23	26	North declination.
10	11	16		10	19	51		10	23	27	
11	11	36		11	20	3		11	23	28	
12	11	56		12	20	15		12	23	28	
13	12	17		13	20	28		13	23	28	
14	12	37		14	20	39		14	23	27	
15	12	57		15	20	51		15	23	26	
16	13	16		16	21	1		16	23	25	
17	13	35		17	21	12		17	23	24	
18	13	54		18	21	22		18	23	22	
19	14	14		19	21	32		19	23	20	
20	14	32		20	21	42		20	23	17	
21	14	51		21	21	51		21	23	13	
22	15	10		22	22	0		22	23	10	
23	15	27		23	22	8		23	23	6	
24	15	46		24	22	16		24	23	1	
25	16	4		25	22	24		25	22	55	
26	16	22		26	22	30		26	22	50	
27	16	38		27	22	37		27	22	44	
28	16	54		28	22	43		28	22	37	
29	17	10		29	22	50		29	22	31	
30	17	27		30	22	55		30	22	24	
				31	23	0					

July.			August.			September.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	22	16	1	15	30	1	4	54
2	22	9	2	15	13	2	4	28
3	22	0	3	14	56	3	4	5
4	21	51	4	14	49	4	3	41
5	21	43	5	14	20	5	3	18
6	21	33	6	14	1	6	2	55
7	21	23	7	13	42	7	2	31
8	21	12	8	13	22	8	2	8
9	21	2	9	13	3	9	1	47
10	20	52	10	12	45	10	1	23
11	20	42	11	12	23	11	0	59
12	20	30	12	12	2	12	0	36
13	20	18	13	11	42	13	0	12
14	20	6	14	11	23	14	0	12
15	19	57	15	11	2	15	0	36
16	19	40	16	10	41	16	0	59
17	19	26	17	10	20	17	1	23
18	19	13	18	9	58	18	1	47
19	19	0	19	9	38	19	2	10
20	18	45	20	9	17	20	2	33
21	18	30	21	8	56	21	2	56
22	18	15	22	8	33	22	3	20
23	18	0	23	8	12	23	3	43
24	17	45	24	7	50	24	4	6
25	17	29	25	7	28	25	4	30
26	17	14	26	7	5	26	4	52
27	16	57	27	6	43	27	5	16
28	16	40	28	6	20	28	5	39
29	16	24	29	5	58	29	6	2
30	16	6	30	5	35	30	6	25
31	15	49	31	5	14			

North declination.

North declination. Equinoctiall.

South declination.

South declination.

October. D.	G.	M.	November. D.	G.	M.	December. D.	G.	M.
1	6	48	1	17	16	1	23	0
2	7	10	2	17	33	2	23	6
3	7	34	3	17	49	3	23	11
4	7	55	4	18	5	4	23	15
5	8	18	5	18	22	5	23	18
6	8	40	6	18	37	6	23	21
7	9	3	7	18	52	7	23	24
8	9	25	8	19	7	8	23	26
9	9	46	9	19	21	9	23	27
10	10	8	10	19	35	10	23	27
11	10	30	11	19	49	11	23	28
12	10	53	12	20	2	12	23	28
13	11	13	13	20	15	13	23	28
14	11	33	14	20	28	14	23	27
15	11	54	15	20	40	15	23	27
16	12	15	16	20	53	16	23	26
17	12	34	17	21	4	17	23	25
18	12	56	18	21	15	18	23	23
19	13	16	19	21	26	19	23	21
20	13	36	20	21	36	20	23	16
21	13	56	21	21	45	21	23	12
22	14	16	22	21	54	22	23	8
23	14	35	23	22	3	23	23	3
24	14	57	24	22	12	24	22	57
25	15	12	25	22	20	25	22	52
26	15	30	26	22	28	26	22	46
27	15	49	27	22	35	27	22	39
28	16	7	28	22	42	28	22	32
29	16	25	29	22	49	29	22	25
30	16	42	30	22	55	30	22	17
31	16	59				31	22	8

Solstic.

South declination.

	Ianuary.			Februatie.			March.		
	D.	G.	M.	D.	G.	M.	D.	G.	M.
1	21	59		1	14	21	1	3	44
2	21	50		2	14	2	2	3	21
3	21	41		3	13	42	3	2	57
4	21	31		4	13	22	4	2	33
5	21	20		5	13	2	5	2	9
6	21	9		6	12	41	6	1	46
7	20	58		7	12	21	7	1	22
8	20	47		8	12	0	8	0	58
9	20	34		9	11	39	9	0	34
10	20	22		10	11	18	10	0	10
11	20	9		11	10	57	11	0	14
12	19	56		12	10	35	12	0	38
13	19	43		13	10	13	13	1	0
14	19	28		14	9	51	14	1	24
15	19	13		15	9	28	15	1	48
16	18	59		16	9	6	16	2	12
17	18	44		17	8	44	17	2	35
18	18	29		18	8	21	18	2	59
19	18	14		19	7	59	19	3	22
20	17	57		20	7	36	20	3	46
21	17	41		21	7	14	21	4	9
22	17	25		22	6	51	22	4	32
23	17	7		23	6	28	23	4	55
24	16	50		24	6	5	24	5	19
25	16	32		25	5	41	25	5	41
26	16	14		26	5	18	26	6	3
27	15	56		27	4	55	27	6	27
28	15	38		28	4	3	28	6	50
29	15	18		29	4	8	29	7	13
30	15	0					30	7	53
31	14	41					31	7	57

South declination.

South declination.

Equino-

ctiall.

North declination.

Aprill.				May.				June.			
	D.	G.	M.		D.	G.	M.		D.	G.	M.
1	8	20		1	17	54		1	23	8	
2	8	41		2	18	9		2	23	12	
3	9	3		3	18	24		3	23	15	
4	9	5		4	18	38		4	23	19	
5	9	46		5	18	53		5	23	22	
6	10	8		6	19	7		6	23	24	
7	10	29		7	19	21		7	23	25	
8	10	50		8	19	34		8	23	26	
9	11	11		9	19	48		9	23	27	
10	11	31		10	20	0		10	23	28	
11	11	51		11	20	12		11	23	28	
12	12	12		12	20	25		12	23	28	
13	12	33		13	20	37		13	23	27	
14	12	52		14	20	48		14	23	27	
15	13	12		15	20	58		15	23	26	
16	13	32		16	21	9		16	23	25	
17	13	51		17	21	20		17	23	24	
18	14	11		18	21	30		18	23	21	
19	14	29		19	21	39		19	23	18	
20	14	47		20	21	48		20	23	14	
21	15	5		21	21	57		21	23	11	
22	15	24		22	22	5		22	23	7	
23	15	41		23	22	14		23	23	2	
24	16	0		24	22	22		24	22	56	
25	16	18		25	22	29		25	22	51	
26	16	34		26	22	35		26	22	46	
27	16	50		27	22	41		27	22	39	
28	17	6		28	22	48		28	22	32	
29	17	22		29	22	56		29	22	26	
30	17	39		30	22	58		30	22	18	
				31	23	3					

North declination.

North declination.

Solstic.

Iuly.

July.			August.			September.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	22	19	1	15	17	1	4	33
2	22	2	2	15	0	2	4	10
3	21	53	3	14	42	3	3	47
4	21	45	4	14	23	4	3	24
5	21	36	5	14	5	5	3	0
6	21	26	6	13	46	6	2	37
7	21	16	7	13	26	7	2	13
8	21	6	8	13	7	8	1	52
9	20	55	9	12	48	9	1	28
10	20	44	10	12	28	10	1	4
11	20	32	11	12	8	11	0	41
12	20	21	12	11	47	12	0	18
13	20	9	13	11	28	13	0	6
14	19	56	14	11	7	14	0	30
15	19	43	15	10	46	15	0	35
16	19	30	16	10	26	16	1	17
17	19	16	17	10	4	17	1	40
18	19	2	18	9	43	18	2	4
19	18	48	19	9	21	19	2	26
20	18	34	20	8	59	20	2	50
21	18	19	21	8	37	21	3	13
22	18	4	22	8	16	22	3	37
23	17	48	23	7	56	23	4	0
24	17	33	24	7	33	24	4	23
25	17	19	25	7	11	25	4	46
26	17	2	26	6	49	26	5	9
27	16	45	27	6	26	27	5	32
28	16	28	28	6	3	28	5	55
29	16	11	29	5	40	29	6	19
30	15	53	30	5	19	30	6	42
31	15	36	31	4	57			

North declination.

North declination.

Equinoctiall.

South declination.

October.				November.				December.			
D.	G.	M.		D.	G.	M.		D.	G.	M.	
1	7	5	South declination.	1	17	31	Solstic.	1	23	5	South declination.
2	7	27		2	17	47		2	23	10	
3	7	49		3	18	3		3	23	13	
4	8	12		4	18	19		4	23	16	
5	8	34		5	18	34		5	23	20	
6	8	56		6	18	49		6	23	23	
7	9	18		7	19	4		7	23	25	
8	9	46		8	19	18		8	23	26	
9	10	2		9	19	32		9	23	27	
10	10	24		10	19	46		10	23	27	
11	10	45		11	20	0		11	23	28	
12	11	7		12	20	13		12	23	28	
13	11	28		13	20	26		13	23	28	
14	11	49		14	20	37		14	23	27	
15	12	10		15	20	50		15	23	26	
16	12	31		16	21	1		16	23	25	
17	12	51		17	21	12		17	23	24	
18	13	11		18	21	23		18	23	21	
19	13	31		19	21	33		19	23	18	
20	13	51		20	21	43		20	23	13	
21	14	11		21	21	52		21	23	9	
22	14	30		22	22	1		22	23	6	
23	14	50		23	22	11		23	23	0	
24	15	9		24	22	19		24	22	54	
25	15	27		25	22	27		25	22	49	
26	15	46		26	22	34		26	22	43	
27	16	4		27	22	41		27	22	35	
28	16	22		28	22	48		28	22	28	
29	16	39		29	22	54		29	22	21	
30	16	56		30	22	59		30	22	13	
31	17	14						31	22	4	

The sixt Chapter sheweth how to take the height of the Sunne with the Crosse staffe, or with the Astrolobe, and also how to finde the true Meridian, with other necessarie matters.

TO take the true height of the Sunne at the sea, the best way is, to doe it with the Crosse staffe, for that the sea is mœueable, and causeth the ship to heaue and set little or much. And also vppon the Crosse staffe the degrees be larger marked than the Ring or Astrolobe: and in a large instrument, an error is sene soner and better, than it is in a smal instrument.

How to obserue y Sun.

Now to take the height of the sunne, to knowe the Altitude of the Pole aboue the Horizon, doe this: First set the sunne with a Compasse to know when that the sunne commeth nere vnto the Meridian: as sone as you se that the sunne is come vnto the south and by East, then begin to take the height of the sunne with the crosse staffe, in this manner: Put the Transuastory vpon the long staffe, then set the ende of the long staffe close at the corner of your eye, winking with your other eye, and remouing the Transuastorie forwards or backwards, vntill you doe se the lower ende of it (being iust with the Horizon) and the vpper ende of it, (being iust with the middle of the sunne) both to agree with the sunne and the Horizon at one time: and so haue you the true height of the sunne. This done, still obserue the same, vntill you se the sunne at the highest, and beginning to descend, and then haue you finished. Yet notwithstanding this is to be noted: that it is best to take the height of the sunne with the Crosse staffe, when the sunne is vnder fiftie degrees

To take the height of y Sun with y crosse staffe

The cause why y crosse staffe is

best to take the height of the Sun vnder 50. degrees.

in height aboue the Horizon, for two causes. The one is thus: Till the sunne be fiftie Degrees in height, the degrees be largely marked vpon the Crosse staffe, but after (the sunne being aboue 50. degrees high) they be lesser marked then the other is, for that the sunne being vnder 50 degrees in height, you may easily take y height, because you may easely see or viewe the vpper ende and the nether ende of the Crosse staffe both at one time: but if it doth exceede 50. degrees, then by ꝯ meanes of casting your eye vpwardes and downewards so much, you may some commit errour, and then in like manner, the degrees be so small marked, that if the sunne doth passe 50. or 60. degrees in height, you must leaue the Crosse staffe, and vse the marriners runge, called by them the Astrolaby or Astrolobe.

To take the height of the Sunne with the Astrolobe.

Nowe to take the height of the sunne with the common Ringe or Astrolobe, doe thus: The sunne beinge (as before is declared) neere the Meridian or South, obserue it (vntill you haue the greatest height thereof) in this manner: Holde the Ring of the Astrolobe vpon one of your fingers, and turne the Atheliday vp & downe, vntill you see the shadow of the Sunne pearce or passe through both the sights thereof, being sure that the Astrolobe doth hang vpright, which you may proue in this manner.

How to correcte your Astrolobe if it doth not hang vpright.

Loke at how many degrees and minutes the Atheliday doth stande vpon the Astrolobe, then tourne the Atheliday vnto the same number of the degrees and minutes on the other side of the Astrolobe, and then taking the height of the sunne againe, if it doe agree as it dyd before, then the Astrolobe doth hang vpright: but if it do not, then it doth not hang vpright. For knowledge of the true height of the sunne (the Astrolobe not hanging vpright) do thus: if the Astrolobe be truely marked, marke the diuersitie, that being knowen, rebate from the

the greatest height half the diuersitie, or else adde vnto the lesser height halfe the diuersitie, & that shall be the true height of the sunne, although that the Astrolobe doth not hang vpright.

The Astrolobe is best to take the height of the sunne, if the sunne be very high, at 60.70.or 80.degræs: and the cause is this: The sunne comming nære vnto your Zenith, hath great power of light, for to pearce the two sights of the Atheliday of the Astrolobe, and then it is not good to vse the Crosse staffe, for that the sunne burteth the eyes of a man, and besides that, it is too high to occupy the Crosse staffe, (as before is declared) so that this waye you may very much preserue your eyes. If you haue not glasses vpon your staffe (to saue your eyes in taking the height of the sunne) but bæ vnprouided of them, do thus: take and couer the Sunne, with the ende of the Transuastorie of the Crosse staffe, vnto the very vpper edge or brinke of the Sunne, (so shall you not næde to behold the brightnesse of it) and with the other ende of the Transuastorie to take the Horizon truely, and that being done, for that the sunne is 30. or 31. minuts in Diameter or breadth, therefore you shall rebate xv. minutes from the Altitude or height of the sunne, and then that which shall remaine, shall be the true height of the sunne, from the Centre or middle of the sunne.

The Astrolobe is best to take the height of the Sunne at 60.70 or 80.degree. in height.

How to preserue your eyes when you touch the Sunne with the crosse staffe and haue no glasses.

The Diameter of the Sunne is 30, or 31. minuts.

And furthermore, there is some errour in the taking the sunne or starre with the Ballastell or Crosse staffe, and that groweth by this meanes: for that the true Centre (which is the sight of the eye) is within, in the middle of the eye, and not in the outside of the eye: so that the ende of the long staffe in the setting of it vnto the corner of your eye, doeth stande somewhat further out than the sight of your eye, that is to say, that the sight of the eye is somewhat further into the head, than the end of the staffe doth come: wherfore you

Some errour in the crosse staffe and how to reforme it.

must pare away a little of the ende of the staffe, for some mens vses more, and some menes vses lesse, for that it is according as you may set the staffe vnto your eye, for some men nede pare away little or nothing, and some men must pare away 14. or 15. minutes, as you may set the staffe, because some mens eyes be further into their head, than other some mens are, and the bones of some mens face stand further out than other some doe. It is moreouer conuenient to know ỹ true Meridian or south, which you must do either with a good compasse, or with a perfect Diall or Nædle: but if you be on the land, this you may do, on a peece of timber or any other thing that standeth fast, with a paire of Compasses make a Circle, then in the middle or center where the fote of the Compasse did stand, set a wier vpright (as circumspectlye as you can) and then you may do this: loke in the morning (so it be on playne ground, that you may see the Horizon Circle, without any let at the Sunne rising, for the shadowe of the wyre) and there set a pricke: then at the setting of the sun you shall set another pricke, euen at the circumference of the Circle, then deuide that with your Compasses euen in two peeces, and strike a straight lyne from the wire or center of the Circle, to the middle or deuided pricke, and that shall be the true Meridian. Or else (the wyer standing vpright) first in the forenoone when the toppe of the wyer doth touch, or is readie to come into the circumference or edge of the Circle, there make a pricke: then in the afternoone in lyke manner, at the very comming out or touching of the wyer of the edge of the Circle, there make an other pricke euen with the comming out of the shaddowe: this done (as circumspectly as you can) diuide these two prickes in the middle, then as is before is said, drawe a lyne from the center or wyre to the middle Pricke, and that shaddow, shall bee your true Meridian. After an other man-

To get the true Meridian vppon the lande.

ner

ner you may doe this: loke and watch when the wyre giueth the shortest shadow, and there make a pricke, then drawe a line from that pricke to the wyre, which shadow shall be the true Meridian.

To know the true Meridian at the sea, and also if your compasse varied and to know how much they be varied.

And yet furthermore, for that it is most conuenient to knowe the true Meridian at the Sea, because in long voyages, going farre vnto the Westward or Eastward, the Compasse doth varie: to find the true Meridian, do this. Set the sunne with your Compasse at her rising or appearing aboue the Horizon, and then (knowing what point and parte the sunne doth rise at) set the sunne with your Compasse at her setting or departing vnder the Horizon, and (that beeing knowen) you shal perfectly knowe whether the Compasse bee varied, and howe much: for ensample this, I doe set the sunne at her rising with the Compasse, and she doth rise vpon the East point: in lyke manner also I doe set the sunne with the Compasse at her setting, and do finde her to set West Northwest: so I doe see the compasse to bee varyed one point, that is to say, the North point doth stande North and by East, &c. And furthermore (for that seldome times the sunne doth rise and set cleere by the meanes of the clowdes, and other impediments nere the Horizon) you may get the true Meridian thus: at any time in the forenoone, first set the sunne with your compasse, and then take the true height of the sunne. Nowe you (knowing howe many degrees the sunne was highe at that point of the Compasse) you may in lyke manner obserue the Sunne in the afternoone, vntill you doe finde the sunne iust at that height that it was in the forenoone, marking at what point of the Compasse the sunne is, and so shall you see perfectly whether the compasse be varyed or no, and also how much: for ensample thus: I take the sunne vppon the southeast point 20. degrees aboue the Horizon, and then in the afternoone I doe obserue the sunne

vntill such time as I do finde the Sunne iust 20. degrees aboue the Horizon againe, and then I set the Sun with the compasse, and do finde the sunne to be at 20. degrees in height West southwest, so that I set the compasse to be varied one point, that is to say, the North point doth stand North and by East. &c.

Another way also to knowe the true Meridian by the sunne: that is, to set the sunne with the Compasse at her greatest height aboue the Horizon, and so you shall knowe whether the compasse bee varyed, and how much: and loke what is spoken of the sunne by day, you may doe the like by night by any of the starres that you perfectly doe knowe, doing as you doe by the sunne in all points: but you cannot doe it so well and truely by the Mone, by the meanes of the swiftnesse of the Mones motion in the Zodiacke, you may also finde the variation of the Compasse by the North Starre, as thus: set the North Starre with the Compasse, if the North point doe stand right with the Starre, then it is not varyed, but if it doth not stande right with the Starre, then it is varyed: and that must be done when the two Starres of Charles Wayne called the pointers, be right vnder or right ouer the North starre, but if that the Starres be West frō the North starre, then the North starre is the third parte of a point vnto the Eastward of the North Pole. If the two Starres of Charles Wayne, called the pointers, be due East from the North star, then ỳ North starre, is the third part of a point vnto the Westward of the North Pole. &c.

To finde the variation of the compasse in the night, by the starres, but not by the Monne.

This haue I said, because that sometime in sundrie places, the compasse doth varie, and especially in the saylyng of long voyages, running East and West, (called the Northeasting or Northweasting of the Compasse) therefore I woulde not wishe them to meddle with the wending of their compasse, or whetting of the side of the

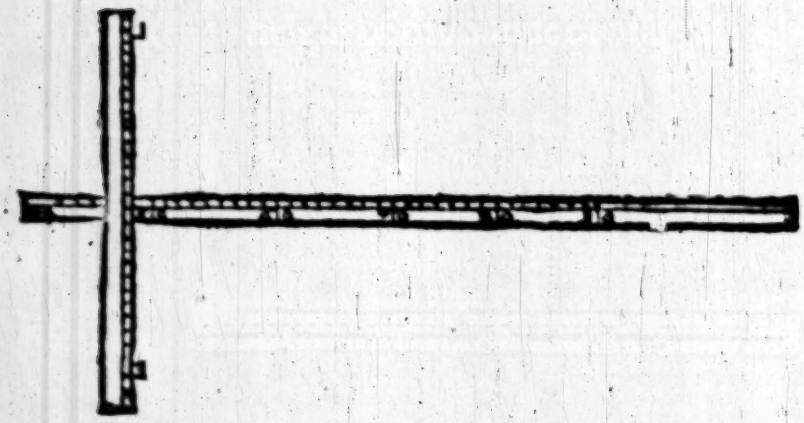
Meddel not with your cōpasse, all-

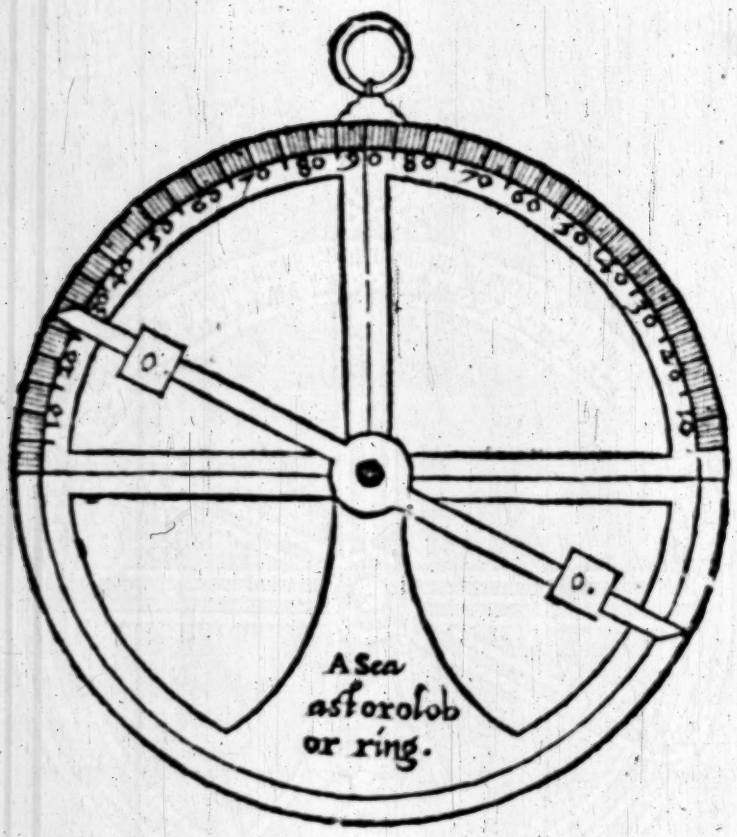
nædle, to the end to make it stande due North, but circumspectly to awaite the altering of the Compasse, and what quantitie it doth alter: as you may doe very well by the order before rehearsed, and then let your Compasse alone: for although that it doth varie two or three pointes, you may make account according to the varyation, as thus, I admit the Northwest point standeth due North, and my course is to goe due West, I will occupie the Southwest point in this case for the West point. And thus (by obseruation and trying of my Compasse) I care not what pointe standeth due North, for it is all one, so that you consider what point standeth North. And also there is deuised by one Norman a Compasse maker, a verie necessarie deuice in a Compasse, that you may set the North point, vppon what degree you list, according vnto the true variation of the Compasse, at all times at your pleasure.

thought it be varyed. To trie by the compasse if it be varyed.

The Bella Stella, or Crosse staffe:

to take the height of the Sunne or Starre.





¶The vii. Chapter sheweth how to handle the declination of the Sunne to know the altitude of the North Pole aboue the Horizon, (the height of the Sunne beeing truly taken and knowen in any place betweene the North Pole and the Equinoctiall) so that the Sunne be vnto the Southwardes of you, at the taking of the Sunne vpon the Meridian.

YOU most consider by the Regiment or table of declination (going before) that the 11. day of March the Sunne is Equinoctiall, entering then the first point of Aries, (called the Equinoctiall of springe time, where she hath no declination. The 10. day of Aprill, the sunne entereth into the first minute of Taurus, then hauing declination to the Northwards 11. degrees 30. minutes. The 12. day of May, the sunne entereth the first point of Gemini, hauing then declination 20. degrees 12. minutes. The 12. daye of June the sunne entereth into Cancer, where he (making his greatest progresse to the Northwards) hath 23. degrees 28. minutes of declination. But now in this our time, some do affirme it to be 23. degrees and a halfe, but it lacketh two minutes. The 14 day of July the sunne entereth into Leo, comming downwares to the Equinoctiall, hauing 20. degrees 12. minutes of declination. The 14. day of August the sunne entereth into Virgo, hauing declination 11. degrees 30. minutes. The 14. of September, the sunne entreth into Libra, (then being Equinoctiall, and hauing

The greatest declination of the Sunne.

Equinoctial of autumne.

no declination) which is called the Equinoctiall of Autumne or harueſt, where he beginneth his ſouth declination. The 14. of October the ſunne entreth into Scorpio, where his declination is 11. degrees 30. minutes. The 12. of November the ſunne entreth into Sagittarius, his declination being 20. degrees 12. minutes. The 12. day of December the ſunne entereth the firſt minute of Capricorne, where the ſunne (making the greateſt progreſſe to the ſouthwards) hath of declination 23. Degrees and 28. minutes. From whence he returneth to the Equinoctiall againe. The 11. of Ienuarie the ſunne entereth

The greateſt declination to the South.

into Aquarius, where his declination is 20. Degrees 12. minutes. The 10. daye of Februarie the ſunne entereth into the firſt minute of Piſces, and hath of declination 11. degrees 30. minutes. The 11. day of March, the

The yeere is compared vnto a Ring or Adder biting hir tail.

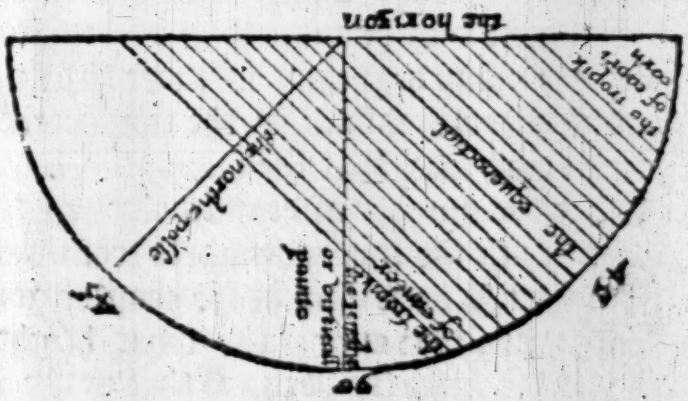
ſunne returneth to the ſelfe ſame place that it departed from before: wherefore the Egiptians dyd paynt the yeere lyke to an Adder byting her tayle, and (not hauing the vſe of letters) they made a Ring, and named it Annulus, as it were Annus, that is to ſaye, a yeere, becauſe a Ring doeth tourne rounde in it ſelfe, as doth the yeere. The height of the ſunne being knowen, you knowing the day of the moneth, and what yeere it is after the Biſſextilis,) muſt turne to the daye of the month, in the regiment or Table going before, where right againſt the day of the moneth you ſhall finde the degrees of declination, and the odde minutes belonging to the degrees of declination folowing: that being knowen (that is to ſay, the height of the ſunne with the degrees and minutes of the declination) if the Sunne haue North declination, you ſhall ſubſtract or take awaye the Sunnes declynation from the height of the Sunne with the Degrees and minutes: and then that which remaineth ſhall be the true height of the Equinoctiall, which being knowen, pulling that ſumme out of 90. with the degrees and minutes,

The height of the ſunne being taken & knowne

minutes, that which doth remain, shall be the true height of the North Pole aboue the Horizon. But if that the sunne hath south declination, you shall adde or put that declination vnto the height of the sunne, which shall shew vnto you the true height of the Equinoctiall, of the which sunne (being taken from 90.) that which doth remaine, shall be the altitude of the North Pole aboue the Horison. For this is to be noted: loke what height the Equinoctiall is aboue the Horison, it is equall or iust so much betweene the Zenith or verticall point, and the North Pole. In like manner, loke howe many degrees and minutes are betweene the Equinoctiall and your Zenith, iust that number of degrees & minutes is from the North Pole downe to the Horison, which is the cause that you must pull the height of the Equinoctiall, from the Horison, with the degrees and minutes. For that your Zenith is alwaies 90. degrees from the Horison, as you see by this figure.

then how to handle the declination to know the height of the Poles.

Thinges to be noted as touching the taking of the altitude of the Pole.



¶ The viii. Chapter sheweth you how to handle the declination of the Sunne: when you are between the Equinoctiall and the Sunne: that is to say, the Sunne being to the Southwards or Northwards of you, betweene the sun and the Equinoctiall, or vnder the Equinoctiall: the height of the Sunne beeing truely knowen or taken.

NOW furthermore if you bee vnto the South parts neere vnto the Equinoctiall, so that the Sunne haue anye great declination either to the southwards, or to the Northwards, you being betweene the Equinoctiall and the Sunne, when you haue taken the true height of the sunne, with the Astrolobe to know the height of any of the 2. Poles, doe this: seeke the declination of the sunne for that daye, with the degrees and minutes, the declination being knowen in the height of the Sunne in like manner, then adde the declination of the sunne vnto the height thereof, and it will exceede or be more than 90. degrees, then again loke how many degrees it is more than 90. with degrees and minutes, that shall be the true height of the Pole towards that side that the sunne is: because the Equinoctiall is the number of degrees aboue 90. (which is your Zenith) to the contrarie parte from the sunneward. For (as I haue said in the chapter going before, and is generall for euer) loke what height soeuer the Equinoctiall is from the horizon, that is the true distance betweene the Zenith, and the Pole: in like manner, loke what distance is betweene the Equinoctiall & the Zenith, the same is the true distance betweene ỹ horizon and the Pole, that is to saye, the Pole is so many

A thing to be noted.

ny degrees in altitude aboue the Horizon. As it is a common saying (in knowing howe farre wee bee vnto the Southwardes or Northwardes) that the Pole Artick is so many degrees in altitude, or (as some will saye,) that wee are in so many degrees in Latitude: the question is all one in effecte, although the one bee called Altitude or height, and the other Latitude or wideneſſe, yet it hath one ſignification: for as when you saye Altytude or height of the Pole, you meane the Pole is rayſed so manye degrees aboue the Horizon. So lykewiſe when you saye Latitude, you meane, you be so many degrees in wideneſſe from the Equinoctiall, for that your Zenith or verticall point is so manye degrees from the Equinoctiall. Moreouer, if you chaunce to be right vnder the Equinoctiall, as you cannot say thut you haue anye Latitude, so lykewiſe cannot you saye that you haue any Altitude, for that the two Poles bee then iuſt with your Horizon, and in lyke manner the Equinoctiall is your Zenith or verticall point. But when you will take the height of the Sunne with your Aſtrolobe, then loke what declination the Sunne hath, eyther to the southwardes or Northwardes. Then put the declination of the ſunne vnto the height of the ſame, and the number will be iuſt 90. degrees: if it lacketh any thing of 90. degrees, then it ſignifieth that the Equinoctiall lacketh so much of the Zenith, and so much iuſt ſhall the Pole be aboue the Horizon, towardes that part that you bee in from the Sunnewardes. But contrariewiſe if it doth exceede or be any thing more than 90. degrees, then (as afore is declared) it ſignifieth that the Equinoctiall is as much as that number (both in degrees and minutes. On the contrarie ſide from the Sunwardes, that is to saye, your Zenith ſhall be betweene the Sunne and the Equinoctiall, & the Pole ſhall be so many degrees or minutes aboue the Horizon, as is the diſtaunce betweene the Zenith and

Altitude or Latitude is all one queſtion in effect.

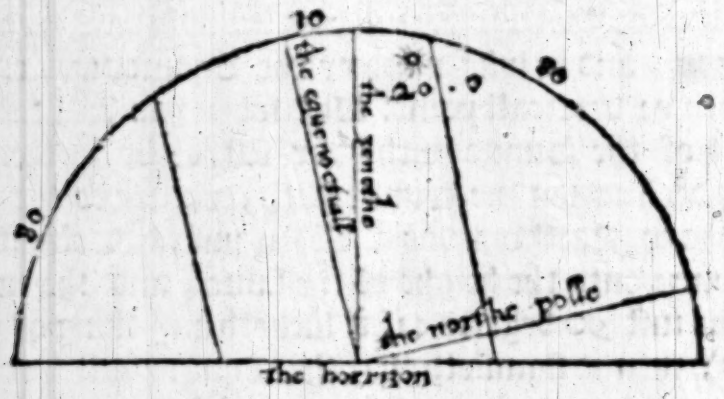
Being vnder the Equinoctiall you haue neither Latitude nor Altitude, for that the Equinoctial is your Zenith, & the Poles your Horizon.

Of your Zenith being betwen the Equinoctial and the Sunne.

the Equinoctiall, towards that part or side that the sun is one. Wherefore I doe thinke it necessarie to giue certaine ensamples (and first take this for an ensample.) Admit I doe take the height of the sunne vnto the Northwardes 80. degrees aboue the Horizon, & the sunne hath declination vnto the Northwards 20. degrees, to which I adde or put the height, that is to say 80. degrees, being the height of the sunne) & 20. degrees, being the declination of the sunne, do make 100. from which I pull 90. away, which is my Zenith, and so there remaineth 10. degrees. Wherefore you may conclude, that the Equinoctiall is 10. degrees to the south part of your Zenith, & the sunne to be 10 degrees to the North part of your Zenith, so that the North Pole is 10. degrees aboue the Horizon, as by example it is declared.

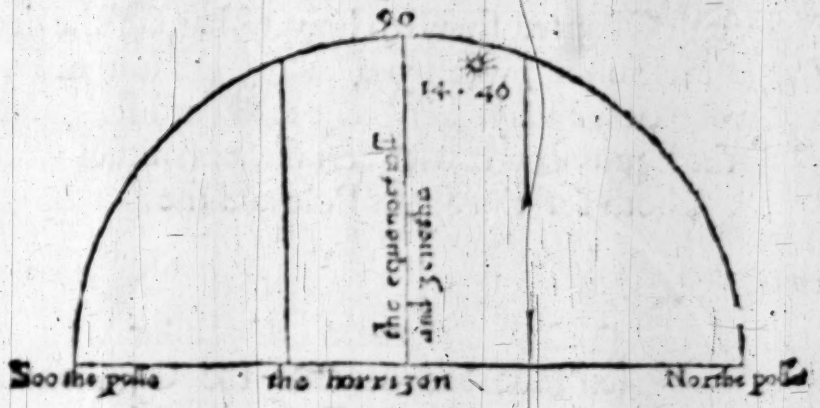
An ensample.

An ensample where the Pole is 10. degrees aboue the Horizon.

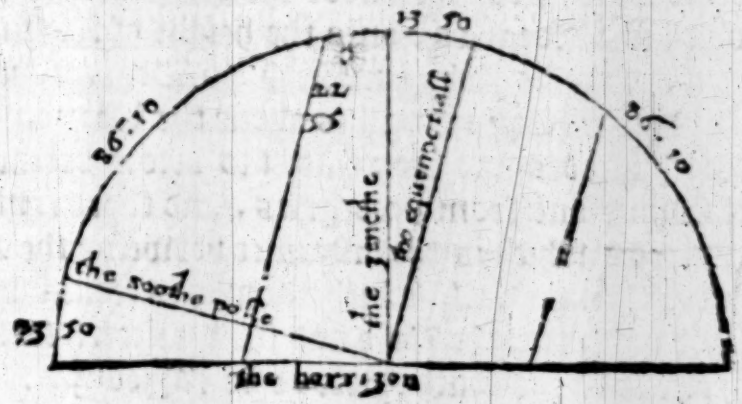


And for the second ensample, admit I take the sunne vnto the Northwardes. 75 degrees, and 20. minutes aboue the Horizon, the sunne hauing North declination. 14, degrees. 40. minutes, I then doe adde or put 14. degrees. 40. minutes, vnto 75 degrees 20. minutes, and those two ioyned together maketh 90. Degrees, whereof you may conclude, that the Equinoctiall is your Zenith, and then the two Poles be with your Horizon, as by this example it doth appeare.

And



And now folowth the third enſample. I admit the Sunne be taken with the Aſtrolobe 81. degrees and 15. minutes aboue the Horizon, and the ſunne hath South declination 22. degrees 35. minutes, wherefore I do adde or put together 81. degrees and 15. minutes, being the height of the ſunne, and 22. degrees 35. minutes, being the declination, and that maketh 103. degrees 50. minutes: from which I take away 90. Degrees, which is my Zenith, ſo that there remayneth 13. degrees 50. minutes: ſo that you may ſafely conclude; that the Equinoctiall is 13. degrees, 50. minutes, vnto the North parts of the Zenith, & then it muſt nedes folow, that the South Pole is 13. degrees 50. minutes aboue the Horizon, as by this enſample it is declared. An enſample.



The

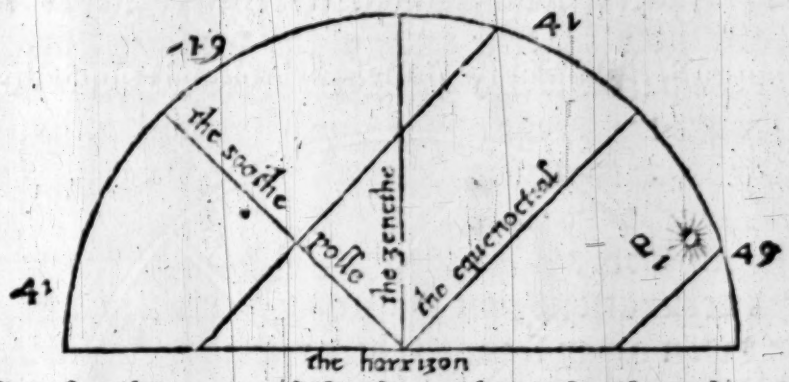
¶ The ninth Chapter ſheweth how to handle the declination of the Sunne, when you are beyonde the Equinoctiall, that is to ſaye, betweene the South Pole and the Equinoctiall: with certaine enſamples both for the South Pole and the North Pole.

AND furthermore, if you bee vnto the ſouthwardes beyonde the Equinoctiall, as betweene the Tropicke of Capricorne and the ſouth Pole, then to vſe the declynation of the Sunne to knowe the heyght of the ſouth Pole or Antarticke Pole, by the heyght of the ſunne, there is no other matter in the doing thereof, but whereas wee (beeing vnto the North partes, doe adde the ſouth declynation vnto the height of the ſunne, and rebate the North declination from the height of the ſunne, ſo in like manner the contrarie is to be vſed, that is to ſaye, to rebate the ſouth declynation from the heyght of the ſunne, and to adde vnto the heyght of the ſunne the North Declination. As for enſample, I admit the height of the ſunne be taken rrviii. Degrees aboue the Horizon due North, and the declination of the ſunne is rri. Degrees vnto the Northwardes, I doe then adde the declynation of the ſunne which is 21. degrees, vnto the height of the ſunne (beeing rrviii. degrees) which maketh 49. Degrees, and ſo many degrees the Equinoctiall is aboue the Horizon vnto the Northwardes, and then (as it is before declared) pull that ſumme out from 90. degrees, and there remayneth 41. degrees, which is the diſtaunce betweene the Zenith and the Equinoctiall, which alwaies is equall with the diſtance betweene the Pole and the Horizon: ſo that you may conclude the ſouth Pole to be rayzed 41. degrees

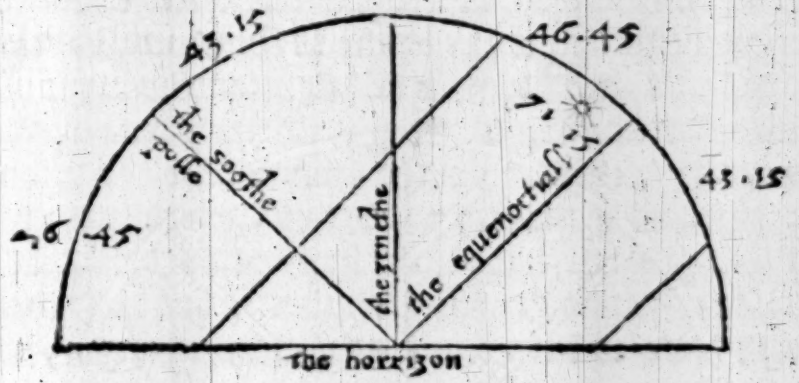
To take the Sunne to the Northward you being betweene the South Pole and the Equinoctiall.

An enſample by taking the South Pole 41. degrees aboue the Horizon.

grées aboue the Horizon. As by this figure it is shewed.

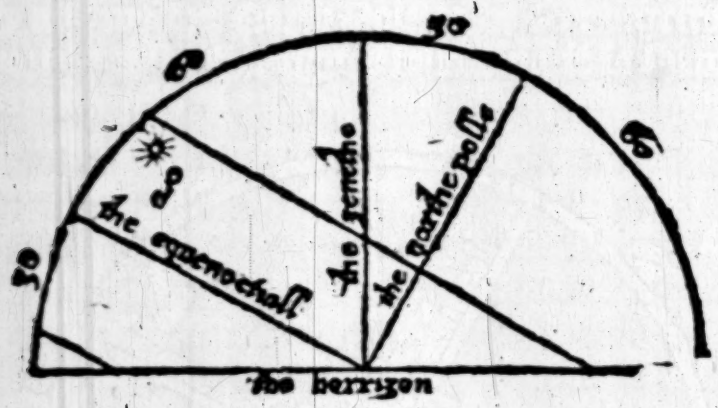


And furthermore if the sunne haue south declination, then (as before is declared) you must substract or take away the Sunnes declination from the height of the Sunne, as for ensample. The height of the sunne being taken at 50. degrees. 30 minutes into the North partes, and the sunne hauing 7. degrees and 15. minutes of declination vnto the Southwardes, from which height of the sunne (for that you are vnto the Southwards beyond the Equinoctiall (you must rebate the declination, which is 7. degrees and 15. minutes, and there resteth 43. degrees 15 minutes, for the true height of the Equinoctiall, which summe you must take out of 90. Degrees, that done, there remaineth 46. degrees 45. minutes, the true height of the south Pole aboue the Horizon, otherwise called the Antarticke Pole, as by ensample of this figure is plainly shewed.



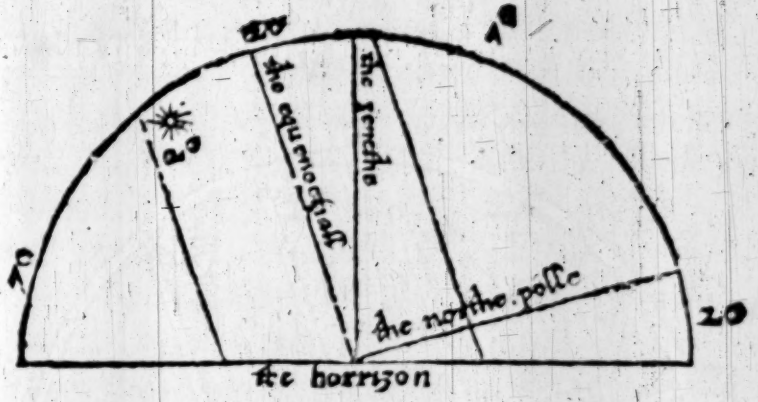
An ensample by taking the North Pole 60. degrees aboue the Horizon.

Yet furthermore I doe thinke it conuenient to giue you an ensample vnto the Northwardes, that you may perfectly know the true order of the working, both for the North part and also the south parte. Admit therefore I take the height of the sunne due south, at 50. degrees aboue the horizon, the sunne hauing then North declination 20. degrees: Now (for as much as you haue the North Pole aboue the horizon) you must rebate the sunnes declination from the height: so that 20. Degrees being taken away from 50. there resteth 30. which is the height of the Equinoctiall aboue the horizon, & that 30. being taken from 90. there resteth 60. So that you maye boldly affirme the North Pole to be 60. degrees aboue the horizon, as by this figure following it is shewed.



In like manner the sunne being taken at that height and due South, hauing the like declynation also to the Southwards that it had before to the Northwards: that is to say, being 50. degrees in height, and hauing 20. degrees of declination vnto the south parts, you must adde or put the declination of the Sunne vnto the height of the same, and it maketh 70. degrees, which is the height of the Equinoctiall aboue the horizon: this done, that 70. being taken out of 90. there remaineth but 20. so that the North Pole is but 20. degrees aboue the horizon, as by the

the enſample of this figure is ſhewed.



For in handling of the declination, the true height of any of the Poles is knowen. Allwaies hauing this conſideration, that if they haue the North Pole aboue the Horizon, they doe allwaies adde or put to the height of the ſunne, the ſouth declination and the ſunne hauing North declination, they pull away the ſunnes declination from the height thereof. Now contrarywiſe, if the ſouth Pole be aboue the Horizon, you muſt adde the North declination vnto the height of the ſunne, and take away the ſouth declination from the height of the ſame. Now to knowe which of the two poles be aboue the horizon, is a very eaſie matter, & is knowen two waies. For firſt if the North Pole be aboue the Horizon, you may know it by all the ſtarres round about the Pole as Charles wayne, and the Guardes, with ſuch other markes as be about the North Pole. Neither can you paſſe ſo ſodainely beyond the Equinoctiall, but it muſt nedes be knowen vnto you, and then you muſt vſe that kinde of working with the ſunnes declination, that in the chapter or rule before is rehearſed: and alſo you may know it by the Arke or bearing of the ſtarres and lights round about you. Thus much haue I ſayd as touching the ſunnes declination, becauſe I know that diuers Engliſh men would haue trauayled further

A thing to be noted in the hādling of the ſuns declinacion.

How to know which of the two Poles be vnder the horizon.

The cauſe why Engliſhmen

haue not trauailed far beyond the Equinoctiall.

beyond the Equinoctiall than they haue done, but that they haue not had the capacitie to handle the sunnes declination when they haue beene beyond the Equinoctiall, that is to saye vnto the south partes, hauing lost the markes aboue the North Pole, as the North starre and other, and as for the starres of the south, they haue not bene acquainted with them, but haue beaten vp & downe alongst the Coast of Ginny and Binney, and there haue spoyled and consumed their men, thorough the extraordinarie heate of the Sunne, not knowing that in going further to the south partes, they shoulde haue brought themselues into a good temperete Clymate againe.

An vntemperate place for extreame heate.

Temperate Clymate.

¶The 10. Chapter sheweth, howe to handle the Sunnes declination vnto the Northwards, wwhere the Sunne dooth not set vnder the Horizon, & also to take the sunne at the lowest being due North.

FOR further vse of the Sunnes declination, if you haue any occasion to trauell vnto the Northwardes or southwardes more than 67. degrees of Altitude of any of the two Poles, or if the sunne haue anye great declination vnto those parts that you are in, then shall not the Sunne goe downe vnder the Horizon in a longe time after as you be in distance vnto the North partes, for if you were right vnder either of the 2. Poles of the world, then would not the sunne goe vnder the horizon in halfe a yeere, so that there should be continually day: And now for the handling of the Sunnes declination, to know the height of the Pole, and to take the Sunne North at the lowest, doe this: First with your Crosse staffe, obserue the sunne at the lowest, taking the true distance betweene the Horizon and the sunne, that bee-

Of beeing vnder either of the Poles

Of taking y heyght of the sunne due North

ing

ing truely done, loke what declination the sunne hath, then haue you to consider, that except the sunne be nære vnto her greatest declination, that is to say, in the latter ende of Gemini, (or the beginning of Cancer,) the sunne doth decline little in 24. houres: but if the declination be verie swift, you must seeke the sunnes declynation vpon the day before, and the daye after, halfe the diuersitie of which shall be the sunnes declination: for that the sunne is at the angle of midnyght. The sunnes true declination bæing knowen, rebate the heyght of the same from the declination of the sunne, and so shall you haue the true content in degræs and minutes, that the Equinoctiall is vnder the Horizon due North, and then pulling that summe from 90. that which remayneth, shall be the height of the Pole aboue the Horizon: for as it is before declared, loke what heyght the Equinoctiall is aboue the Horizon, that is equall the distaunce betwæne the Pole and the Zenith, and loke what distaunce is betwæne the Equinoctiall and the Zenith the same distaunce is betwæne the Pole and the Horizon, in lyke manner, loke how dæpe vnder the Horizon, the Equinoctiall is vnto the Northwardes, so farre equall is the height of the Equinoctiall vnto the Southwardes As for ensample, admitte I were vnto the Northwards of the North cape, the sunne bæing in her greatest declination vnto the Northwardes, which is aboute the 11. day of June. 23. degræs and nære a halfe: this being knowen I take the sunne due North at the lowest, iust fiue degræs aboue the Horizon, the declination bæing xxiii. degræs and 28. minutes. Wherefore I rebate from that fiue degræs, and so ther remaineth 17. degræs and 28. minutes. For the depth of the Equinoctiall vnder the Horizon, and then do I pull that summe from 90. and there remayneth 72. degræs 32. minutes, for the true height of the North Pole aboue the Horizon, as by this en-

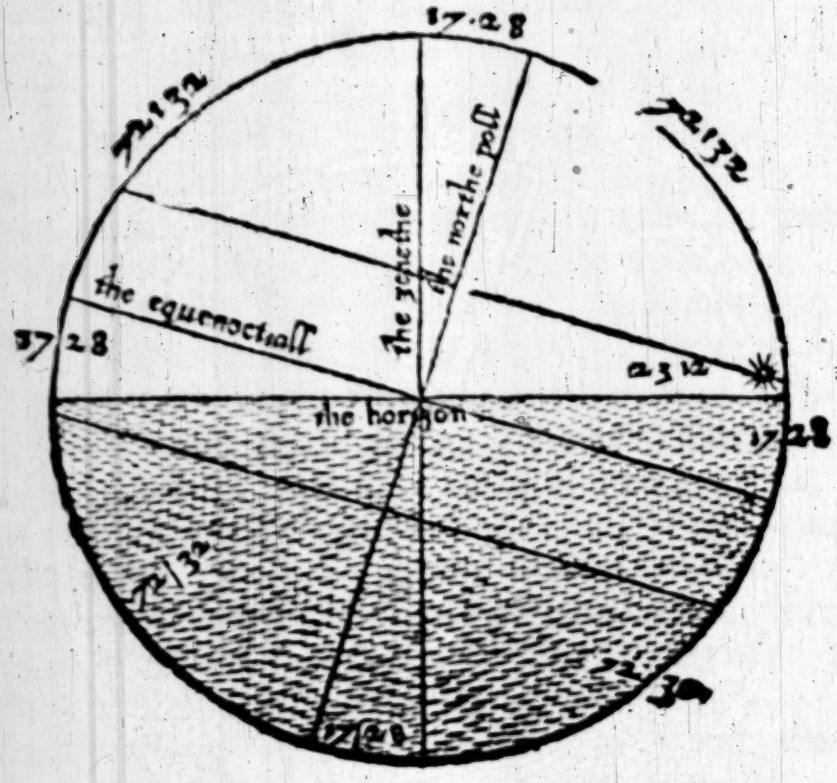
at the lowest.

A thing worthy to be noted, touching the Sunnes declination.

A thing to be noted of the pole and the Equinoctiall the Zenith, and the Horizon.

The Sunne taken due North at 5. degrees.

cample it is declared.



By this enſample you may alſo know the true height of any of the two Poles, and how to obſerue the ſunne at the loweſt, when the ſunne commeth neereſt vnto the Horizon, as well as you may when the ſunne is vppon the Meridian at the greateſt height from the Horizon, which is verie neceſſarie for them that doe occupie vnto the Northwardes, as vnto ſaint Nicholas in Rouſey, it is alſo verie neceſſarie for them that would attempt any voyages of diſcouerie to finde out the paſſage to come vnto Cataye and China, and the Ilandes of Moluccas, vnto the Northwardes, as into the Eaſt by Noua Zemla, or to the Weſt by that waye that Captaine Frobiſher, hath

Of voyages for diſcouerie to the northwards either to y Eaſtward

hath begun to the Northwardes of Baculayas and Labrador, for it is to be supposed that amongest that broken landes and Ilandes, that there may be founde passage vpon the North part of America, but the great quantities of Ise maye somewhat hinder the prosperitie of that discouerie, and yet notwithstanding my opinion is, that it is not frozen there so much to haue such huge quantity of Ise, but that it may bee frozen more farther vnto the North partes, & so by some current or streame brought thether, and so is stayed vpon the coast of Labrador and Baculayas, by the meanes of the great current that commeth out of the Bay of Merico, all alongst the North side from Floriday vnto Baculayas or New-found land.

by Noua Zemla, or to the West ward by Cape de Paramantia.

Additions.

And yet notwithstanding, it may be possible ý if that they did discouer more vnto the Northwardes, that they should not meete with so much Ise. For at the North cape in Norway, which is much more vnto the Northwards, ther is seldome seene any great quantity of Ise, & yet some ships hath ben beaten of vnto the North of ý Cape neere 200. leagues, so that they had then neere 80. Degrees of height of the North Pole aboue the Horizon, and yet they haue not met with Ise, and yet it is farther vnto the North partes by 17. degrees, then that place that Frobisher was at.

Wherefore if it were attempted, there is no doubte but they should finde it Nauigable eyther to the East part, or to the West parte: And I am of this opinion, that the thing most feared in making their discouerye, vnto the Northwarde, deserueth not so greatlye to bee feared as they doe make it, the cause why they are so loth to go verie farre vnto the Northwardes, is, for that it is the frozen Zone, but my opinion is, that in Summer time it is not to bee feared, but the further vnto the North

Northwardes, the more temperate warme, by meanes of the long continuaunce of the sunne: for as we see by cõmon experience, that a thing once being made warme, cannot sodeinly bee made colde, neither is there doubt of any great cold vntill the sunne be vnto the southwards of the Equinoctiall: for I admit that a shippe should saile vnto the Northward, and not stay vntill the North Pole were eleuated 80. degrees aboue the horizon, I do thinke then they should finde it verye temperate and warme, vnto the middle of September, for that by the space of nine weekes together, that is to say, from the tenth day of May, vnto the twelfth day of July, the sunne should come no nearer vnto the Horizon due North then ten degrees, and 30. degrees vnto the south parte aboue the Horizon, and yet it is possible that it may be colde there vntil the ende of May, for that the sunne must haue a time to make the aire warme. For lyke as a thing once being colde, cannot be sodainely made warme, so in lyke manner a place being once made warme, cannot be sodainely made colde. And furthermore, hee that were in the Latitude of 80. degrees, should haue but a short Paralell: for the whole compasse of the Earth and sea going East and West, to come rounde about to that place againe in the same Paralel, is but 1250. English leagues, euery league containing three English miles: So that in sailing of lesse then 500. or 600. leagues, they might see whether it were nauigable or not. For this is one principle, that if that they doe not meete with lande, then they shall finde sea, to accomplish the long desired passage to finde out Cattaye.

Of temperatenes the Pole being raised 80. degrees.

The length of the paralel 80. degrees, is but 1250. English leagues.

The

¶ The xi. Chapter doth shew how you shall know the length of the day, and to know how much the daie is shortned or lengthened by the Sunnes declination.

NOW I thinke it conuenient for Seafaring men to know the length of the daye in any place that they haue occasion to go vnto: for that they haue occasion to trauel into all the climates and places, transporting themselues many tymes quickly from one place vnto another: and although the auncient writers haue appointed certaine climates, and other late writers in lyke maner haue made Tables very exact for the longest or shortest day in any of those clymates and other places, according to the eleuation of the Pole: yet haue they not opened any way vnto them, in giuing any order, for them to know when the day is an houre longer or shorter, whereby they might at all times know the length of the day, which notwithstanding is very necessary for them, for that they be abroad vnder saile both night and daye, and in like maner for that they must kæpe account of houres and tymes exactly, in as much as they ought to kæpe an account of the shippes way: wherefore it must nœds be most necessarie for Nauigation, to know the true tyme of the sunnes rising and setting, which you shall know by this meanes: First this as it is not vnknowen, that vnder the Equinoctiall the Sunne is 12. houres aboue the Horizon, and twelue houres vnder the Horizon, (what declination soeuer the Sunne hath) so that there the sunne riseth at fiue of the clocke and setteth at fiue of the clocke for euer.

How necessary it is for a Seafaring mā to know the length of the daye.

Vnder the Equinoctiall the day is alwaies 12 houres long.

And where the Pole is raised 16. degræs and 44. minutes, there the longest daye is 13. houres, (the Sun hauing

The Pole

16.deg.44. mi.the day 13. houres long when it is at the longest.

uing her greatest declination at 23.degrees 28. minutes and the shortest day is 11. houres long, and then (take) when the Sunne hath declined 23. Degrees and a halfe either backwards or forwardes, for then the daye is an houre longer or shorter and proportionably: when the Sunne hath declined 11. degrees 44. minutes, then it is

The Pole 30.deg.48. mi. longest day 14. houres long.

halfe an houre longer or shorter, &c. Moreouer where the Pole is elevated 30. degrees 48. minuts, there the longest day is 24. houres, and the shortest day is 10 houres long, the Sunne then rising at 5. of the clocke, and setting at 7. of the clocke, and there when the Sunne hath declined 11. degrees and 44. minutes from the Equinoctial, &c. vnto the greatest declination, then the day is an houre longer or shorter, and when the Sunne hath declyned 5. de-

The Pole 41.deg.23. mi. longest day 15. hou. long.

grees 52. minutes, then the day is halfe an houre longer or shorter, &c. Furthermore also, where the Pole is raysed 41. degrees 23 minutes, there the longest daye is 15 houres, and the shortest 9. houres long, (the Sunne hauing his greatest declination, and as then rising at 4. of the clocke 20. minutes, and setting at 7. of the clocke 30. minutes) so that there when the sunne hath declyned 7. degrees 49. minutes from the Equinoctiall, the day shall be an houre longer or shorter, and when it hath declined

The Pole raised 49.degrees 1.mi. the longest daye is 16 houres 8p.

3. degrees 54. minutes, the daye shall be halfe an houre longer or shorter, &c. And furthermore, where the Pole is raysed 49. degrees one minute, there the longest daye is 16 houres, and the shortest 8. houres long, the Sunne rysing at 4. of the clocke, and setting at 8 of the clocke, so that there when the Sunne hath declined 5. degrees 52. minutes from the Equinoctiall, then shall the daye be an houre longer or shorter. And when the Sunne hath declined 2. degrees 56. minutes, then the day shall be halfe an houre longer or shorter, &c. Yet furthermore, where

The Pole raised 54. deg. 30.

the Pole is raised 54. degrees 30. minutes, there the longest daye is 17. houres, and the shortest 7. houres long,

the

the Sunne then rising at 3. of the clocke 30 minutes, and setting at 8. and 30. minutes: then when the Sunne hath declined 4. degrees and 41. minutes from the equinoctiall, to the greatest declination, the day is an houre longer or shorter, and when he hath declined 2. Degrees 21. minutes, the day is halfe an houre longer or shorter, &c. Where also the Pole is raised 58. degrees 27. minutes, there the longest day is 18. houres long, and the shortest but 6. and then when the sunne hath declined 3. degrees 55. minutes from the Equinoctiall, then the daye shall be an houre longer or shorter: and when the sunne hath declined 2. degrees lacking two minutes, then the day shall bee halfe an houre longer or shorter. Furthermore also, where the Pole is raised 61. Degrees 18. minutes, there the longest day is 19 houres long, and the shortest but 5. houres: then shall the sunne rise at two of the clocke 30. minutes and set at 9. and 30 minutes, and then when the sunne hath declined 3. degrees, and 21. minutes from the Equinoctiall, then shall the day bee an houre longer or shorter, &c. Furthermore, where the Pole is raised 63. degrees 22. minutes there the longest day is 20 houres long, and the shortest but foure houres, then shall the sunne rise at two of the clocke, and sette at ten of the clocke, and when the sunne hath declined two degrees, and 56. minutes from the Equinoctiall vnto the greatest declination, then shall the day be an houre longer or shorter, &c.

mi. then the longest day is 17. hours long.

The Pole raised 58. degrees 27. minuts the longest day is 18 hours long.

The Pole raised 61. degrees 18. minuts the longest day is 19. houres longe.

The Pole 63 degrees 22 minutes longest day 20 houres longe.

Now where the Pole is raised 64. degrees 49. minutes, there the longest day shall be 21 houres long, and the shortest but three houres: and then when the Sunne hath declined but two degrees. 36 minuts from the Equinoctiall vnto the greatest declination, the day shall be an houre longer or shorter. Where also the Pole is raised 65. Degrees, there the longest day shall be 22. houres, and the shortest but two houres long, and when that the

The Pole raised 64. degrees 49. minutes the longest day 21. houres longe.

The Pole 65. degrees the longest daye 22. houres long

Sunne hath declined but 2. degrees & 20. minutes from the Equinoctiall, &c. then the daye shall be an houre longer or shorter, &c. And where the Pole is rayled 66. degrees 20. minutes, the longest day shall be three & twentie houres longe, and the shortest but one houre long, and then when that the Sunne hath declined but two Degrees 8. minutes, then the day shall be an houre longer or shorter, and then where that the North Pole is rayled 66. degrees and 32. minutes, there it is 24. houres longe, for that when the Sunne hath his greatest declynation vnto the Northwardes, then at midnight, you shall see halfe the Sunne, and then when that the Sunne hath the greatest declination vnto the South parts, then you shall see but halfe the sunne at noone, and then in the going but 15. miles further vnto the Northwards, that is, but one quarter of a degree, then the sunne shall be cleane aboue the Horizon at the due North, and not seene vnto the South at noone aboue the horizon, the sun hauing his greatest declination to the South, and then the day shall be an houre longer or shorter, when that the sunne hath declined one Degree 57. minutes from the Equinoctial, and so forth vnto the greatst declynation. And thus much haue I saide as touching the length of the day, whereby you may knowe at all times the true length of the daye in any Latitude betweene the Equinoctiall and the eleuation of the Pole at 66. degrees and 32. minutes, by knowing how many degrees the sunne is declined, and that you may know on euery day by the regiment going before, hauing this consideration, that if the sunne being vpon the Equinoctiall, and hauing no declynation, that then in any Latitude the day is alwaies iust 12. houres long. And you must note this, that it is called the day from the rysing of the sunne, vnto the setting of the same vnder the Horizon, and not from day light vnto day light. For before the sunne rise, and after

The Pole 66. degrees 20. mi. the longest day 23. houres long.

The Pole 66 degrees 32 mi. then the Sunne shall not set vnto them.

The Sunne cleane aboue the Horizon due North and not to appeare aboue the Horizon South, at noone.

To know the length of the day, at any time in any place what the day is.

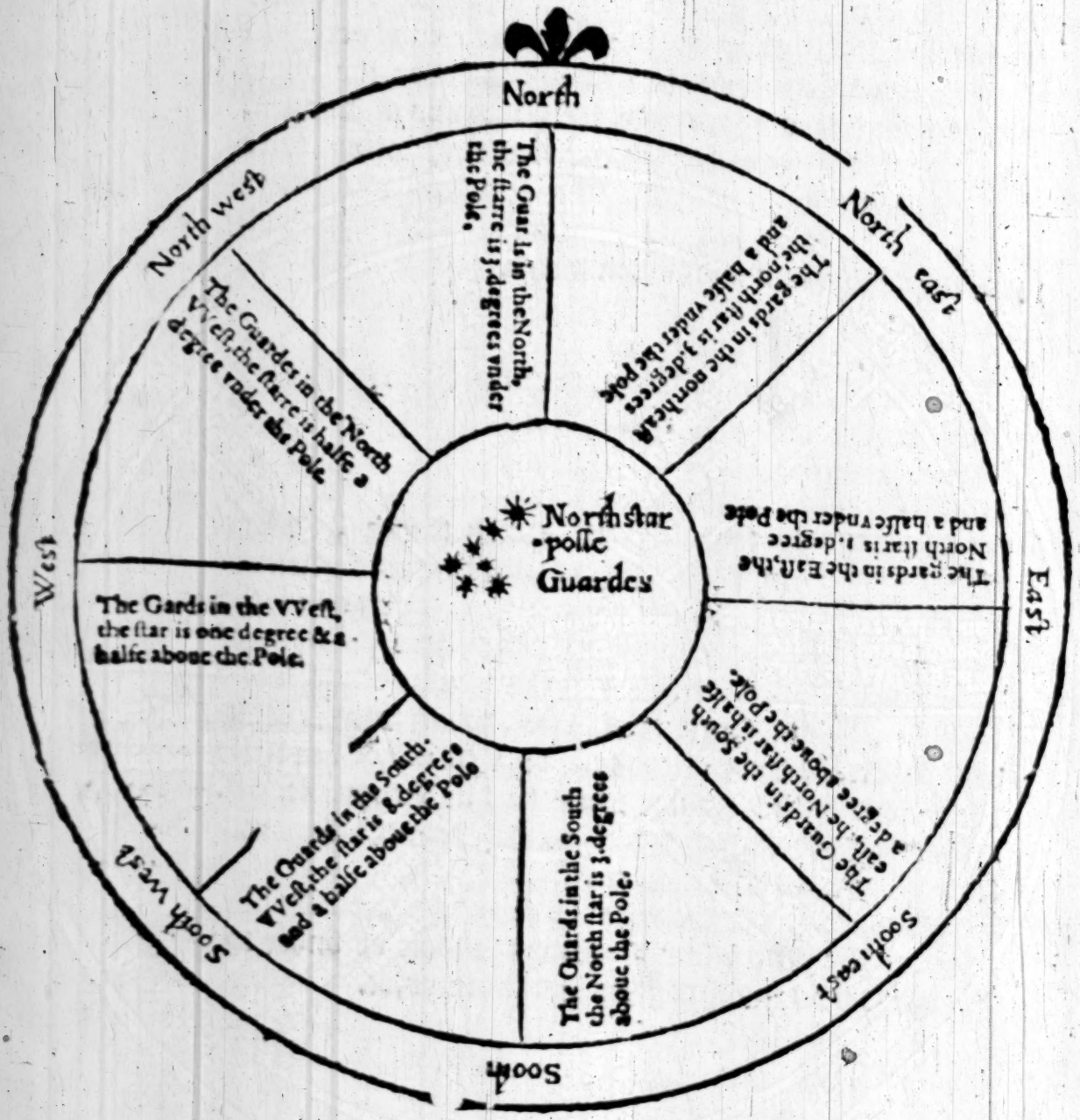
after that the Sunne is set, it is counted for no parcel of the day, but it is called the day light. And furthermore, the day light will appeare by that time that the sunne doth touch the 17 degree of the Horizon before the sunne rising, and also the day light will not be cleane gone vntill the sunne be more than 17 degrees vnder the Horizon: for as you may perceiue here with vs at London, that when the sunne hath his greatest declination vnto the Northwards in June, that the day light remayneth all night, for that the Sunne goeth not vnder the Horizon, but 15 degrees and two minutes.

¶ The xii. Chapter is of the North STARRE.

So touching the North starre, I saye but little thereof, for that is sufficiently declared in the Art of Nauigation, the Starre hath Longitude vnto the signe of Gemini, and from the Poles of the world in the signe of Aries, which Starre standeth vppon the tippe of the taile of Vrsa minor, or little Beare, and hath Latitude from the line Ecliptick 66. degrees. 30. minutes, and declination from the Equinoctiall 86. degrees or thereabouts. The North starres declination.

Here followeth the note by the Guardes to knowe whether the North star be aboue the Pole or vnder the Pole, and how many degrees and minutes, &c.

The Regiment for the Sea.



The 13. Chapter doth shew you by the sayling vpon the quarter of your Compasse, in how farre sayling you doe raise a degree, and what you do depart from the Meridian, and in the ende there is a demonstration thereof: reckning it as you doe saile vpon a flat, but not Spherall.

FUrthermore, because there be some that desire to know the alteration of a point, to this ende, that in running of one point, they may rayse or lay a degree sooner in one then in another, as in the sailing South or North keping one Meridian, they raise or laye the Pole. As this for example: In going to the North, you doe raise the Pole, and lay the Equinoctial: contrarywise, going towards the South, you lay the Pole, & rayse the Equinoctiall. But in sayling or going East or West, you doe neither alter your Pole nor Parallell, but onely your Meridian. Whereas in sayling of any other point you doe alter both your Pole and Parallell, and also your Meridian. Wherefore I will open vnto you (in sayling vpon one of the quarters of the Compasse) what euerie point doth raise or lay one degree, in how farre sayling, & how many miles you be departed from the place you departed from, and what space you be departed from your Meridian.

In going Southwards you rayse y Equinoctial, & lay the Pole.

In going to the Northwards rayse the Pole & lay the Equinoctiall

But heere is one thing to be noted (as I suppose) in the most part of Cards they allow for euery degree, but xvii. leagues & a halfe. Your Cards be most commonly made in Lisshborne in Portugal, in Spaine, or else in Fraunce. But as I take it, we in England should alow 60 miles to one degree, that is, after 3. miles to 1. of our English leagues, wherefore twenty of our English leagues should answere

Of English leagues and Spanish leagues.

to

to one degrée, for that three of our miles will not make one of they? leagues, and because they make they? accounts by their leagues in the Cardes, and not by ours, therefore I will shew you by our English myles. An English myle contayneth a thousand paces, and euerie pace fiue foote, and euery foote twelue ynches. Now some thinke that a pace cannot be fiue foote, but a pace Geometricall is two reasonable steppes, for it cannot be a pace, vntill the hinder foote be remoued forwardes, and those two steppes will containe fiue foote, and so may any man indure to goe at pleasure. But now to our purpose: For the sayling of one quarter of the Compasse, this is to be noted: First that in sayling directly South or North, you doe raise or laye the Pole a degrée in three score miles going. In the altering of one point from the south or North in three score and one miles: and you be departed from the lyne of the East and West, or the Meridian twelue miles. In altering of the second point, you rayse a degrée in sayling three score and fiue myles: and depart from your Meridian 25. myles. In altering of the third point, you doe rayse or lay one degrée in sayling three score and twelue myles, and a 9. part: and are departed from your Meridian 40. myles.

A degree is 60. miles or 20. English leagues.

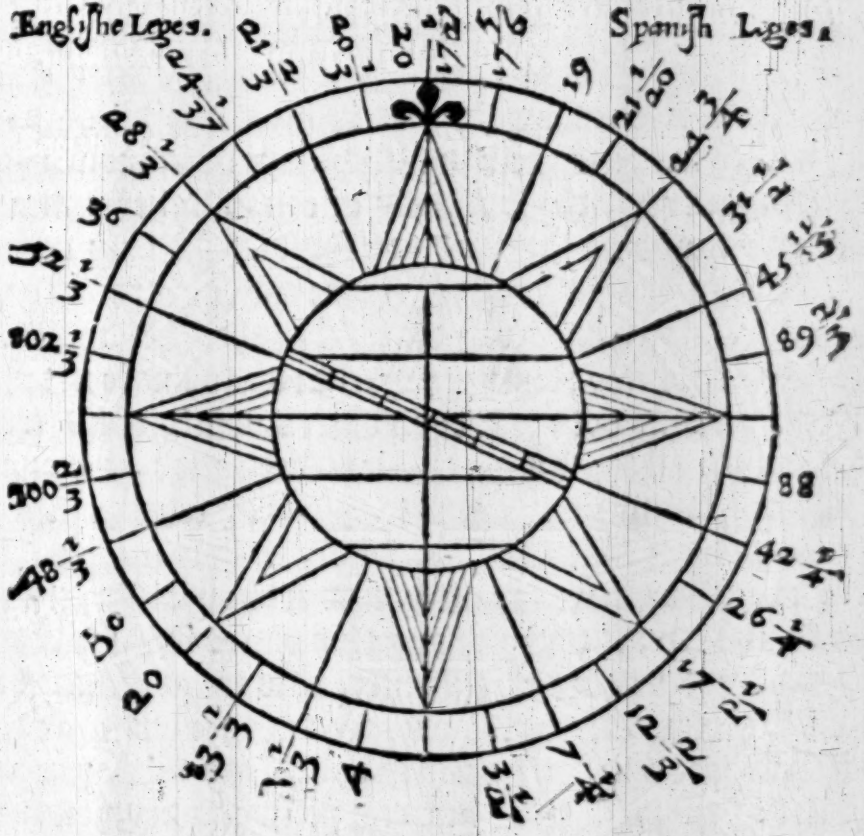
Moreouer, in altering of the fourth point, you do raise or lay a degrée in the going of foure score and fiue miles: and depart from your Meridian three score myles. In altering of the fift point or winde, you rayse a degree in the sayling of 108. myles: and departe from your Meridian foure score and tenne myles. In sayling by the first point, you rayse or lay one degree in 157. miles: & depart from your Meridian lyne 145. miles. Last of all, in sayling by the seauenth point or winde, you doe rayse a degree in going of 308. myles: and depart from your Meridian line 302. miles: and after this maner you may consider of the other three quarters of the Compasse. But if

A note to knowe in how far sayling you do rayse or lay a degree in the sayling by any one point of the compasse.

you

you require to knowe the rayſing or laying of a degree by the leagues of the Cardes: that is, at 17. leages and a halfe: then read the Art of Nauigation, and there ſhall you finde how many degrees you be departed from your Meridian, and alſo from the place that you departed from: and yet that ſerueth for none other place but onely for vnder the Equinoctiall, for he that maketh account of it in anye other place, ſhall be deceiued. For euer as you goe to any of the two Poles, your degrees ſtyll be ſhorter and ſhorter, till ſuch time as your Meridian meete vnder the two Poles, whereof I intreate in the ſixteene Chapter.

For the better vnderſtanding of the things aforeſayd, looke on this figure following.



¶ The 14. Chapter teacheth to know how farre any land is off from you, knowing but the distance betweene any two places: whether you run along by the land, or directly to the shore, or otherwise, with other necessary things.

FOr that I know it very necessary & profitable for Sea-men to know, how neere or far they be into the Sea, and how neere to the land, I will intreat ther of for diuers considerations. And first, because in running alongst the lande there may be danger, which may be such a certaine quantitie into the sea, that they may go both within them and without them. And also in like maner, for that being at one distance frō the land, ỹ land may rise in such a shape or fashion, whereas being neerer, the land may rise in an other forme or fashion: for being farre off, you shall see the hills within the lande, & being neere, the hills or cliffes neere vnto the Sea coast, may take away the sight of the land within. Furthermore also it is very necessarie, to know in what fashion the land doth rise vpon diuers points of the compasse, as oft as the fashion of ỹ land doth alter, & to note it in some book for remembrance. First by what points of the compasse, then the fashion, & last, at how farre off, &c. For knowledge how far off you be from ỹ land, you may haue this help, if there be any two places by ỹ sea coast, whereof you know the distance, how many leagues or miles the one is from the other. In going alongst ỹ coast you shall set them with your compasse, and when you are thwart of thē, if they be but one point asunder, you shall be fiue times ỹ distance betweene them from the lande or shore

A note for the land rising in diuers shapes or fashions.

To know how farre the land is from you where 2. landes bee but one poynte asunder.

shore. If the two places be two points asunder, then the distance vnto the shore, shall be two times and a halfe the distance. If 3. points asunder, then the distance vnto the shore shall be once the distance and a halfe. If foure points asunder, the same distance shall be betweene you and the shore, that is betweene the two markes. If fiue points asunder, then is it vnto the shore but two thirde parts of the distance betweene the two places. If 6. points asunder, (you being thwart of one of them) then shal the distance vnto the shore be, not halfe the distance betweene the two places. And in all these cases before rehearsed, the one place must be thwart of you, the other must be a head or sterne of you: and so it is cleare and true. As for ensample this: I (going alongst by any Coast) doe know before hand, how the one place doth beare from the other, besides this also I knowe the distance, that is to say, how many leagues they be asunder. As for ensample, the two places assigned beare East and West the one from the other, I then (knowing that they be 3. leagues asunder) when I haue brought one of the places South or North of me, do set them with my compasse, the one being North of me, and the other bearing North and by East, that is one point asunder: Now the distance vnto the shore being 5. times the distance betweene the two places which be 3. leagues asunder, I know the shore to be 15. leagues from me, which if the places were but one league asunder) should be but 5. leagues from the shore. Furthermore, if the places be two points asunder, that is to say, y one North, & the other North northeast, then shall the distance vnto the shore be 7. leagues & a halfe from me. Whereas if the 2. places were but a league asunder, it should be but 2. leagues & a halfe vnto the shore And furthermore, if the places be 3. points asunder, that is to say, the one north, & the other northeast & by north, the distance vnto y shore shalbe 4. leagues & a halfe: wher

As if the two places were but one league asunder vnto the shore, it should be but a league and a halfe. If 4. points asunder, that is to say, if the one place be due North and the other place Northeast, then it is vnto the shoare three leagues iust. If but one league asunder, then but one league vnto the shore. Moreouer if the two places be fiue points asunder that is to say, the one North, & the other Northeast and by East, then the distance vnto the shore shall be but 2 leagues: whereas if the two places were but one league asunder, vnto the shore should bee but two miles. Last of all, if the two places be 6 points asunder, that is to say, the one North, and the other East Northeast, then it shall not be a league and a halfe vnto the shore, &c. But if you come directly to the Landewardes, hauing no cause to be thwart of none of those knowen places, then to know how farre you be from the land, you must do as is by the places before spoken of. For if you goe in due North, the one place being North and by west, and the other North & by East, then (the two places being 3. leagues asunder, you shall be 7. leagues and a halfe from the shore: so that if you runne into the shore due North, vntill they be 4. points asunder, that is to say the one North Northwest, and the other North Northeast, then it shall be vnto the shore 3. leagues, and 3 quarters. And furthermore, you still running in due North till the 2. places be 6. points asunder, that is to say, the one place to be Northwest and by North, & the other place to be Northeast & by North, the distance vnto the shore shall be 2. leagues and a quarter. And again, if you runne in due North, vntill they be 8. points asunder, that is to say, the one place Northwest, and the other Northeast: then the distance vnto the land or shore, shall be but halfe the distance betweene the 2. places, that is, but one league and a halfe. Lastly, if you runne to the land due North, vntil the 2. places be 10. points asunder, that

4. points asunder.

5. points asunder.

6. points asunder.

Of going or sailing right into the shore.

that is to saie, the one place Northwest and by west, and the other Northeast and by East, then the distance vnto the shore shall be but one third part of the distaunce betwæne the 2. places, that is, but one league from the land &c. Thus much haue I saide as touching the bearing of the land from you, by the points of the compasse, to know the distaunce, or how farre the land is off: which is very necessarie for Seamen to knowe, for diuers considerations, vs I saide before. If now therefore you knowe not how one head-land doth beare from another, doe thus: in running alongst the Coast, when you sæ the appearing of any lande one before another, set them with your compasses, and loke how they beare from you, by what point of the compasse, and so shall you knowe iustly, how the one lande doth beare or lye from the other. And by this order you may correct your plats, by doing this, as often as you sæ two notable places together: as Ilands, rockes head-lands, mouthes of hauens, sandes, or whatsoeuer else bæ worthie of noting, this done, as often as you doe sæ them together, set them with your Compasse, and that will shew you most certainely, that so they doe beare the one from the other. You may know the distaunce in lyke manner betwæne them, if you knowe your shippes way, as thus: when you first sæ any two places together, as two head-lands, or two Ilands, hauing set them with your Compasse, and knowing how the one beareth from the other, then, for that you will not come neare vnto them, you doe hale off from the land vntill that you haue brought your selfe farre inough off, at your discreation, and when you be thwart of the first head-land, set ỹ other land, and consider how it beareth from you: then reckon your shippes waie, how many leagues the shippe myght goe, vntill you come thwart of the other head-lande, kæping your course along as the two head-landes beare, & so shall you both know the distance betwæne the 2. places &

To know howe farre it is vnto the lande an other way.

also how farre you be off from them. In like manner, hauing consideration of the distaunce betweene the other places that you haue obserued, both by your compasse, and also the shippes way, you may know how farre it is to the shore, going right to the land-wards, by your crosse staffe, although you know not the distance betweene any two places.

As thus: take the swideneſſe betweene anye two places with your Crosse staffe, bearing right to lande-wards, and then remoue the Crosse staffe, or Transuastorie, halfe the length of the transuastorie, that is to say, the end nert vnto you, and then by running in till the two ends of the transuastorie doe agree with the two marks, you shall be halfe way to the shore: then loke how farre the shippe hath gone in that time, for the same distaunce is vnto the lande from the shippe. But if you remoue the transuastorie but a quarter the length of the ransuastorie to you wardes, then at the place wher the ende of the transuastorie doth agree with the two marks, shall be one quarter of the distaunce betweene the shore and you at the first obseruation: and it shall be three times the quantitie vnto the shore, &c.

As I doe farther shewe the conclusions of the Crosse staffe in my booke called The Treasure for Trauailers, the first booke the 10 11. 12. 13. and 14. Chapters. And

To know the shippes waye.

to knowe the shippes way, some doe vse this, which as I take it, is verie good: they haue a peece of wood, and a line to vere out ouer board, with a smal line of a great length, which they make fast at one end, and at the other ende, & middle, they haue a peece of a line, which they make fast with a small thread to stand lyke vnto a crowe foote: for this purpose, that it should driue a stearne as fast as the shippe doth goe away from it, alwaies hauing the lyne so readie, that it goeth out so fast as the shippe goeth. In lyke manner they haue either a minute of an houre glasse,

glasse, or else a knowen part of an houre, by some num-
ber of wordes or such other like, so that the line being ve-
red out, and stopt iust with that tyme that the Glasse is
out, or the number of wordes spoken, which done, they
hale in the logge or pece of wood againe, and lowe how
many fadame the shippe hath gone in that tyme: that be-
ing knowen, What part of a league so euer it be, they
multiply the number of fadames, by the portion of tyme
or part of an houre. Whereby you may know iustly how
many leagues and parts of a league the ship goeth in an
houre, &c. As for example this: I hauing a minute glasse,
but it is better for to haue a portion of time by some nū-
ber of wordes, and the lesser part of time that you haue,
it is the better, for if that the shippe doth goe verie fast,
you shall not haue to much lyne out, and if that the ship
doeth goe but slowly, then you may double the length of
tyme by speaking the wordes twice or thrice ouer, and for
to worke it truely doe this. First let downe your logge
handsomely into the water, and then let the line be mar-
ked according vnto the shippe, a two or three fadame from
the logge accordigly, that it be so farre a sterne that it
commeth into quicke water, that the edie of the sterne
doth not staye it, and that done, then begin to speake your
wordes, and so stayed at iust the ende of the wordes, and
then hale in your logge againe, and measure how many
fote or fadames that you haue verred or put out in that
time, I suppose that your portion of tyme is a 120. part
of an houre, more or lesse it maketh no matter, so that you
doe know the iust portion of tyme.

And suppose that you haue verred fiue and twentie
fadames in the hundreth and twentie parte of an houre,
therefore multiply a hundreth and twentie by fiue and
twentie, and of that multiplication there commeth 3000

fadame

Additions.

fadam, and nowe an Englishe league is 2500. fadame, so that the shippe hath gone one league and 500. fadames in an houre, and the saide 500. fadames is the fifth parte of a league, so that the Shippe hath gone one league and one fifth part of a league in an houre. And this by multiplying the portion of time by the number of fadames, you may kæpe a verie good reckoning of your ships way, having this consideration, that you doe make as often times prowfe as the winde doth increase or decrease.

And for a good order in the kæping your account, doe this: Loke how longe time that the winde hath blowne steddely without any increasing or decreasing, or altering of your course, then when that you do see what or how many fadames that the Shippe hath gone in an houre, then multiplie it vnto so many houres as the shippe hath gone so much by, and then diuide all that summe by 2500 or else it is better to adde all your number of fadames as long as the Shippe hath gone one course without altering: as for ensample this. The shippe hath gone foure houres 25. fadame, in the time of 120. parte of an houre, that is in foure houres. 12000. fadame, and the Winde encreasing, she went three houres 34. fadames. In 120. parte of an houre, that is in three houres 1224. fadames and the Winde decreasing, the Shippe went fiue houres, but 16. fadames, in the 120. part of an houre, that is. 9600 fadame in fiue houres, nowe adde all these numbers of fadames together, that is. 12000. and 12240. and 9600. and all these make 33840. So that the shippe hath gone in 12. houres 33840. fadams, and now diuide this summe by. 2500. which is a league, and then there will stande 13. in the quantitie lyne, and 1340. remaineth ouer. So that you maye conclude, that the Shippe hath gone 13. leagues and a halfe, and 90. fadames: and by this order you may kæpe a verie good order in your reckoning, and so note it in your Booke, and make a marke in your Cart.

Cart,&c. And this is to be noted, that a Spaniſh or Portingale league doth containe 2857. fadames, and an Engliſh league but 2500. fadames.

¶ The 15. Chapter or Rule, treateth of the Longitude,&c.

NOw ſome there be that be very inquiſitiue to haue a way to get the longitude, but that is too tedious for Sea-men, for that it requireth the deepe knowledge of Aſtronomie. For this they muſt conſider, that the whole frame of the firmament is carried round from the Eaſt to the Weſt, in 24 houres, ſo as there remaineth neither light nor marke, but goeth round, ſauing onely the two Poles of the worlde, and theſe two ſtande alwaies faſt. But (as I ſaide before in the ninth rule) of him that going South or North, doth raiſe or lay the Pole, and in like caſe the Equinoctiall altering his Paralel, and cauſing the light of the Firmament to alter the time of their ſhining or abiding aboue our Horizon: ſo he that goeth directly Eaſt or Weſt, doth neyther rayſe nor laye the Pole, ſo that ſtill the lyghts of the Firmament doth make one manner of Arch, according to their Latitude or Declination: but the going Eaſt or Weſt doth alter the Meridian, cauſing the Planettes to haue their aſpectes at another houre or time, altering the time of the chaunges of the Moone, and alſo the time of the Eclipſes: which is neceſſarie for all trauelers by ſea or by lande. Therefore I thought it needefull to be ſpoken off: for as countries haue Latitude from the Pole, ſo in lyke manner they haue appointed Longitude. Nowe therefore you may get the Latitude with inſtruments, but the Longitude

Altering the aſpects.

Of latitude and Longitude.

gitude you must bring from another place, which you can not do but with a Globe or els a Mappe or Carde, and then you must measure from the Meridian of the Canarie Ilands, otherwise called the fortunate Ilands. And in our Latitude of London, euerie 555. miles which containeth 15 degrees, wil answere to one houre of time: and vnder the Equinoctiall 900. miles to 15. degrees: the degrees be as long as the degres of latitude, but towards the Pole fewer and fewer, till they come to nothing vnder the two Poles. And now 37. miles with vs at London, will answere to one degree of our latitude at 51. or 52. degrees of eleuation of the Pole, but the cause why the longitude was fetched from the Canarie Ilandes, I know not, but it was as I suppose, because it was then the Westermost place then knowen: For Ptholameus was the first that ordained that rule.

15. degrees is an houre of time, and at London it is 555. miles.

Longitude beginneth at the Canarie Ilands.

Now furthermore, because you shall knowe the better, I haue drawen out in my second Booke, called the Treasure for trauailers, certaine principall places in the whole world, both their Longitude and Latitude, by which you shall knowe what manner of Arch the Sun with the other lights doth make, and also by the Longitude you may know at what time the Moone with any of the Planets doth make any aspect. Besides this, the Eclipses of the Sunne or Moone, with the chaunge quarters, and full Moone, by a true and exact Ephemerides, through all places, to know the very true houre & minute of time of the Diameter: considering for what Longitude or place your Almanacke was made. And now to get the Longitude, you may do it at the time of the Eclipse of the Moone, for that the Eclipses of the Moone be generall, so that she being aboue your Horizon in any place vpon the superficiall parts of the earth, or Sea, considering (as I said before) by your Almanacke, at that time when the Eclipse shoulde happen,

To knowe the true time of the aspects of the Moone.

the

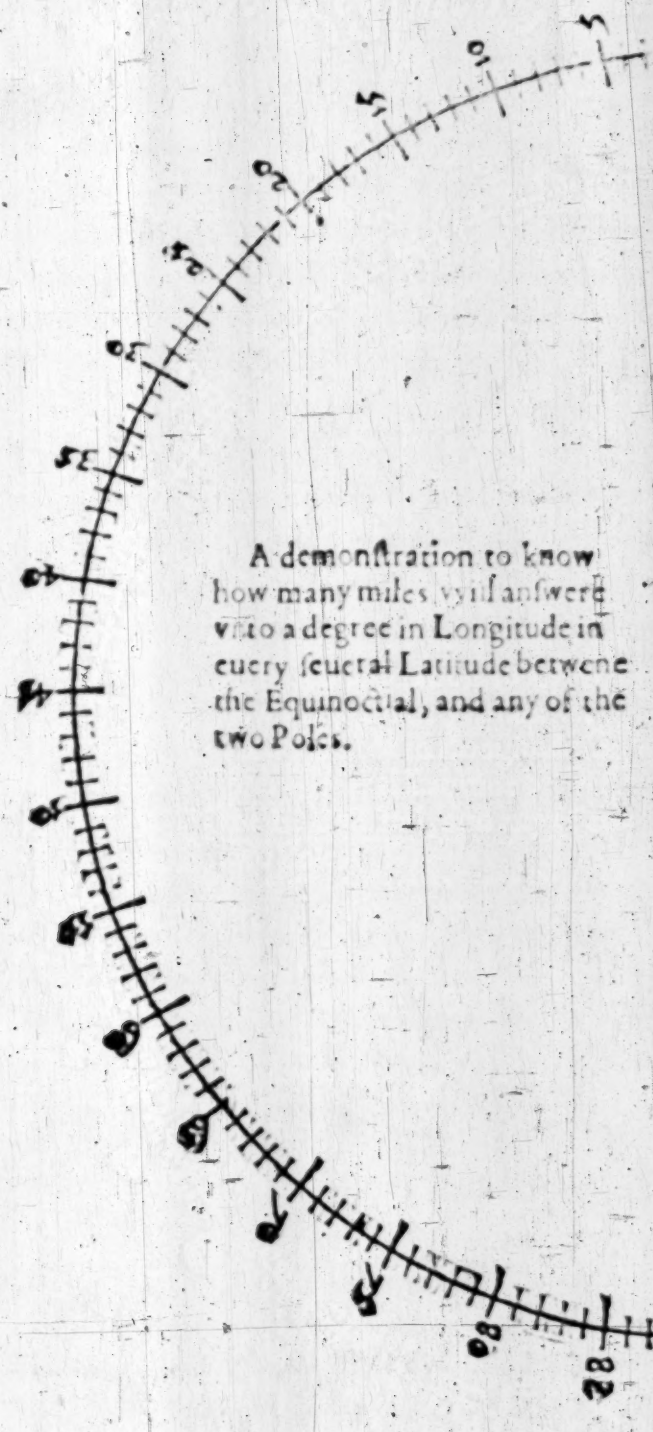
the very houre and minute, knowing also the place that your Almanacke was made for: that done, according to this rule, with a precise instrument you shall take the alteration of the time, with the houre and minute of the Eclipse. And furthermore you might know your longitude with the Ephemerides, by the cõiunction of ☽ Moone with other fixed starres, if it were not for one great infirmitie, and that is the Paralex of the Moone, which the Semidiameter of the earth doth cause, by nærenesse of the Moone vnto the earth: wherefore I would not any longitude with instruments. Therefore let no Seamen trouble themselues with any such rule, but (according to their accustomed maner) let them kæpe a perfect accompt and reckning of the way of their ship, whether the shippe goeth to læwards, or maketh her way good, considering alwayes what things be against them or with them, as tydes, currents, windes, or such lyke.

The Longitude is not to be gotten with instruments on the Sea.

The xvj. Chapter sheweth how many myles will answere to one degree of Longitude, in euery seuerall Latitude, betweene the Equinoctial & any of the two Poles: with the demonstration for that purpose, and the diuersities of aspects of the Moone.

NOw by this rule shall I teach you how many miles will answere to one degræ, for euery seuerall latitude to any of the 2. Poles either Artick or Antartick. And first vnder the Equinoctiall, (the 2. poles being euen with the Horizon) 60. myles doe answere to one degræ, as I said in the 15. Chapter.

And now shall solow the rest. Where the Poles be rayſed 21. degrees 56. miles belongeth to one degree of Longitude. Now the Poles being rayſed 29. degrees 52 miles doe answere to one degree. The Poles being raiſed 36. degrees 48. miles doe answere to one degree. The Poles 42. degrees rayſed 44. miles goeth to one degree of longitude. The Pole raiſed 48. degrees 40. miles to one degree. The pole raiſed 53. degrees 36. miles to one degree. The Pole raiſed 57 degrees 32. miles to one degree. The Pole raiſed 62. degrees 28. miles to one degree. The Pole raiſed 66. degrees 24. miles to one degree. The Pole raiſed 70. degrees 20. myles to one degree. The Pole raiſed 74. degrees 16. miles to one degree. The Pole raiſed 78 degrees 12. miles to one degree. The Pole rayſed 82. degrees 8. miles to one degree. The Pole rayſed 86. degrees 4. miles to one degree. The Pole being rayſed to the higheſt at 90 degrees (being then your Zenith) there all the Meridians meete. And now shall solow a demonſtration of halfe a circle, and that shall shew you how many miles will make a degree, according vnto euery Latitude that you are in, by the replying of a payre of Compaſſes, or a thread made faſt at the lower corner at 90. and there in like maner at one of the pointes of the Compaſſes, and the other point vnto the latitude, that you are in, for all Circles is according vnto theyr Diameters.



A demonstration to know how many miles vyll answere vnto a degree in Longitude in euery seuerall Latitude betwene the Equinoctial, and any of the two Poles.

For in the halfe circle is marked the eleuation of the Pole: in the line of diameter or right line, is marked y miles answering euerie degree: and to know how many miles will answere vnto one degree, first open your compasses, or else laye the thread vnto the eleuation of the Pole ỳ you doe require ỳ number of miles vnto one degree: & then ỳ iust legth of the thread being marked, laye the thread vnto the line of Diameter, or right line, which is the line of miles, & then you shal see at that place is the number of miles vnto one

degrée. &c. Now you muſt conſider that euery houre of time in the chaunging of the Mœne or of the Eclipſes, you muſt alow 15. degrées, euery degrée in miles as you doe ſée in your Latitude of the Countrie, as thus: thoſe places that be to the Weſtwardes of your towne, place, or countrie, by 15. degrees, the Mœne ſhall change rather with them then with you by one houre, becauſe that they ſhall touch your Meridian before theirs by one houre.

15 Degrees anſwereth vnto an houre of time.

And if the towne or place be to the Eaſtwards of you by 15. degrées, then ſhall the Mœne change rather with you than with them by one houre, as for enſample thus: with vs at London the 20. day of May 1574. the Mœne ſhal change at 12. of the clocke at nœne 5. minutes. Now to the weſtwards as farre as Liſhburne in Portugal, the Mœne ſhall change that ſame day at 11. of the clocke 8. minutes, the longitude being therof from the Canarie Ilands fiue degrees 36. minuts. Now to ỳ Eaſtwards, the ſame daye at Rome the Mœne ſhall change at one of the clock 12 minutes, becauſe that they haue Longitude 36. degrees 40 minutes from the Canarie Ilandes, and then by this account vi. degrees and a halfe will anſwere to halfe an houre, and then 3. degrees and a quarter will make a quarter of an houre, and then nine myles and a quarter will make one minute of time with vs at London in our Latitude, ſo by this rule you may know at what tyme and minute the Eclipſes or chaunges of the Mœne doe happen, knowing for what place your Almanacke was made for, as commonly we here in Englande doe make them for the Citie of London.

Thus much haue I ſayd as touching the true tyme of the chaunge of the Mœne, for that ſome people (as I haue ſaid before in the third Chapter, doe contempne and ſaye, why doe they not giue or make rules for euer, to know the houre and minute of the chaunge, full, and quarters of the Mœne? And yet they be vtterly voyde of anye

To know ỳ true time of the change & quarters

knowe

knowledge in the Mathematicall Science, whereby they might know the true time of the chaunge of the Moone: For it is a question Astronomicall, to know the Moones motion: a question Geometricall, to knowe the true time of the aspects, or measure betweene the Sunne and the Moone: and thirdly, it is a question Cosmographicall, to knowe the true Longitude of the place he is in, at the time when the Moone chaungeth, &c.

of the Moone, is a question Astronomicall, Geometricall and Cosmograficall

Now followeth the nert rule which shall treate of Longitude and Latitude.

¶ The seuenteenth Chapter sheweth the Circumference of the whole Earth and the Sea, vnder sundrie Paralels, whereby that any Sea-man may know what quantitie or part of the Earth that he hath sailed or passed by the number of leagues, and also he may know the alteration of time, &c.

AND nowe furthermore I doe thinke it not hurtfull but necessarie for to shewe the Circumference of the whole Earth; at sundrie Latitudes from the equinoctiall, whereby in their sailing that they may know what quantitie or part of the whole Earth that they haue passed or gonne, and also what the diuersitie, aspect, or time that they haue altered themselues from any place assigned, which is necessarie for them that shoulde goe of anye longe voyage

Addition

voyage as this, vnder the Equinoctiall the whole earth is in circumference 7200. leagues, and the halfe thereof is in that place, as where his none is mydnight, is kæping that Paralel is 3600. leagues, and the quarter of the compaſſe is 1800. leagues, and there the diuerſity of time is altered fiue houres, and then in 900. leagues the time is altered thræe houres: ſo that in the ſailing Eaſt or Weſt vnder the Equinoctiall 300. leagues, ſhall alter one houre of time in the Eclipſes or the chaunges of the Mone, &c.

And now farthermore, where the Pole is rayſed 20. degrees aboue the Horizon and to goe rounde about the earth kæping the paralel, the whole compaſſe is 9766. leagues, and the halfe of it is 3383. leagues, and there your none is mydnyght, and then a quarter of that is 1691. leagues and a halfe, and ther the alteration of time is 6. houres, and then 846. leagues doth alter thræe houres of time, ſo that 282. leagues doth alter one houre, in the chaunge or Eclipſes of the Mone, &c. And now in the Latitude of 30. Degrees from the Equinoctiall, the compaſſe of the earth vnder that paralel is 6236. leagues and the oppoſite part in that paralel is 3118. leagues, and there none is mydnight, and then the quarter of the compaſſe of the earth is 1559 leagues, and then paſſing in that paralel 779. leagues and a halfe, doth alter thræe houres of time: ſo that 260. leagues ſhall alter one houre in the aſpectes of the Mone, and alſo in the Latitude of 40. degrees from the Equinoctiall, the whole compaſſe of the Earth & Sea vnder that paralel, is 5516. leagues: So the halfe is 2758. leagues, and a quarter is 1379. leagues, ſo that 689. leagues and a halfe, ſhall alter thræe houres of time, and 230. leagues, will alter one houre of time in the Eclipſes or aſpects of the Mone, &c.

And now where the Pole is rayſed 50. degrees, ther the circumference of the whole earth vnder the paralell

is

is 4628. leagues, and the halfe thereof is 2314 leagues, and the quarter thereof is 1157. leagues: so that 578. leagues and a halfe, doth alter three houres of tyme: so that 193. leagues doth alter one houre of tyme in that paralell. And now in the Latitude of 60. degrees from the Equinoctiall in that paralell, it is but 3600. leagues, to go round about the whole earth & Sea, so that 1800. leagues is the oppolite part of that Paralell, and there your none is midnight, so that 900. leagues shall alter fiue houres of tyme, and 450. leagues, three houres of tyme, and 150 leagues, shall alter one houre of time in the aspects of the Moone, being the 24. part of the compasse of the earth, in that Paralell, &c.

And now where that the Pole is rayled 65. degrees, there the circumference in the Paralel is 3042. leagues, so that the halfe is 1521. leagues, & a quarter of that paralel is but 760. leagues & a halfe: So that 380. leagues shall alter three houres of time, and 126. leagues & three quarters, shall alter one houre of tyme, &c. And also in the latitude of 70. degrees, the compasse of the earth is in the Paralel 2462. leagues, so that the oppolite parte is 1231. leagues, and the quarter is 616. leagues & a halfe, so that 307. leagues and three quarters, doth alter three houres of time, and 102. leagues, will alter one heure in the Eclipses or chaunge of the Moone. And furthermore in the Altitude of the Pole 75. degrees, there the compasse of the earth in that Paralell, is 1864. leagues, and the halfe is 932. leagues, and the quarter is 466. leagues, so that the alteration of three houres of tyme is 233. leagues, and 77. leagues and 2. mile will alter an houre of tyme, &c. And also in the Latitude of eightie degrees from the Equinoctiall, there the whole Circumference of the Earth vnder that Paralell is but 1250. Leagues. And the oppolite parte in that Paralell, is 625. leagues, and then the quarter of that, is but 312. Leagures and a

halfe, so that 156. leagues will alter three houres of time, and 52. leagues will alter one houre, in the time of any Eclipse or any aspects of the Moone, so that you may see how short that the Circumference of the earth is, at the Latitude of 80. degrees: and this I doe cease to shew any further towardes the Pole-wardes, for that it is doubtfull whether that it is Nauigable vnto, so nere the Poles, &c.

¶ The eighteenth Chapter or rule, sheweth how to sayle by the Globe.

NOW to sayle by the Globe, it is conuenient to be spoken off: For that generally the most part of the Sea men make their account as though the earth were a platforme. For they doe not consider that the earth is a Globe, and that the Meridians do growe narrower and narrower towards the two Poles, for it is vnpossible to drawe the face of the earth and the Sea true vpon a platforme, for if you will describe the land true, then shall not the Sea bee true, for as you goe towards the North parts, your Meridians growe together, so as your lynes or pointes bee according to the Arte of Hydrographie, for the Sea shall be broader to the North parts than it is. Nowe and if you would describe the Sea true, with lines, courses, distaunces, hauens and daunders, then should your land be broder to the North parts than it is. As for ensample thus: England and Scotland being both one Iland, in all your Cardes of Nauigation, that doth shewe anye parte to the Southwards, the North parte of Scotland is drawen much bigger than it is, for otherwise the lynes of South and North should not bee according to

You cannot draw the lande and Sea true vpon a flat thing.

To make a Sea plat or Carde.

to the trenting of the land, for if you view it well, you shall finde the North ende of Scotland much more in distance than it is. As you may see in mesuring it by the truncke of your Carde there.

For your better understanding, I heue shewed the compasse of the earth vnder sundrie Latitudes: in the Chapter going before, and by that you may see that the Compasse of the East and West lyne (comming from the Equinoctiall) is much lesser to the Northwardes, than it is to the Southwards. Wherefore when you shall haue any occasion to attempt any voyage to the North parts, it is best to sayle by a Globe: for so shall you better see the distaunces and bignesse of the landes, and in lyke manner your lynes courses. In this order, first (according to the accustomed manner) keepe a perfecte account and reckoning the way of the shippe, by what lyne or poynt your shippe hath made her way good, then must you resort to your Globe. After that consider what place and paralell you be in, which you may doe by the Sunne by day, & by the starres by night. Now (knowing what place and Paralell you be in) set your Globe to the eleuation of your pole: that done, turne to the place of your Zenith, and seeke the opposite of it in your Paralell: for then you knowe that in the same Paralell is your East and West lyne: that had, the iust quarter of that Circle to the Pole, must be deuided into the eight poynts of your compasse, doing so lykewise on the other side.

How to vse the Globe to direct your course, & to knowe how that any place doth beare.

In lyke case if you come to the Southwards, deuide your 8. windes from your Antarticke Pole, to your Paralell circle: and thus must you do euer and anone, for the oftener you do obserue this custome, the better and perfecter shall you course be. Now thus briefly I make an ende of the sayling by the Globe. But for them that do occupie ỳ Southparts, nothing is better thā their cards.

Because I haue declared vnto you the length of certain of the Paralells, what leagues the earth doth contayne in compasse vnder them, now will I shewe you how many leagues distance there is, from one Paralell vnto an other, accordingly as I haue set downe in the Chapter next going before this, as I do shew the Circumference first vnder the Equinoctiall, and then in the Latitude of 20. Degrees, and then 30. Degrees. &c. And first from the Equinoctiall vnto the Latitude of 20. Degrees is 400. leagues, and from 20. degrees vnto 30 Degrees in Latitude, is 200. leagues The like is from 30. vnto 40. Degrees, and from 40. to 50. and from 50. to 60.. So that ther is from the Latitude of 60. degrees vnto the Equinoctiall 1200. leagues, and there a degree of Longitude is but halfe so much as it is vnder the Equinoctiall, and the whole circumference of the Earth, but halfe so much in like manner, and also from the Latitude of 60. Degrees vnto the Pole is but 600. leagues, and there all the Meridians doth meete: and it is from the Equinoctiall vnto either of the 2 Poles of the world 1800. leagues, &c. Which is the fourth part of the compasse of the whole Earth.

The cause why that you may see ỳ sailes of a ship, & not the holde.

Furthermore, for that you maye the beter vnderstand, that the Earth is a Globe or Circular (which any person that doth occuppye the Sea, seeth most apparantly) you shall perceiue it thus: if you see a shippe any thing farre off, you may perfectly see the sayle of it, but not the holde, the cause whereof, is the Circularnesse of the earth, and the water of the Sea: for that the water doth rise and swell betweene you and the other ship, according to the distance betweene both the shippes, because the distance to the Center of the earth or water, is in euery place alike. And he that hath desired to know further heereof, M. Dee hath made mention thereof in Euclides Elements, in his Mathematicall preface, and also

in

in the 12. booke, whether you may haue recourse, yet notwithstanding I will saie a little thereof, whereby you may discerne how farre it is possible to see a shippe vpon the Sea: as thus: if you bee on the Sea in a shippe, so that there bee but halfe a league betweene you and the other Shippe, the water will bee fiue inches and a halfe higher in the middle of the waie betweene both the shipps, for that the water is equall in euerie place vnto the center of the earth, and then the water going by a crooked lyne, then to strike it by a ryght lyne, the middlemost lyne that should come from the center of the earth, shall bee shorter then the other two lines comming from the center of the earth betweene the two shippes by fiue ynches and a halfe, and then it must needes bee said, that the water is higher by the said fiue ynches and a halfe. And furthermore, if the two shippes were a league asunder, then the water by his circulernesse should be 22. ynches higher than the leuell in the middle betweene both the shippes.

Furthermore, if the two ships be two leagues asunder, then the water shall be higher then the leuell in the middle betweene both the ships, by 88. ynches, which is 7 foote and 4. inches. If the two ships be 3. leagues the one from the other, then the water shall be higher than the leuell in the midway betweene both the ships, by 198. ynches, which is 16. foote and a halfe.

To know how many foote and inches that the water is higher than the leuell of the Sea, betweene two shippes.

Furthermore, if the two ships be foure leagues asunder, the water shall be higher than the leuell in the midway betweene both the shippes, by 252 inches, which is 29 foote and 4. inches. And furthermore if the two ships were fiue leagues asunder, the water should be higher than the leuell of the midwaye betweene both the ships, by 550. inches, which is 46. foote lacking two inches. Yet furthermore if the two shippes were sire leagues asunder, the water should be higher than the leuel in the mid-

What a ken is, & y cause why you may see a shippe farther out of the top than vpon y hatches.

dle waye betweene them by 792. ynches, which is 66. foote. Furthermore also, if the two shipps were 7. leagues asunder, the water should be higher than the leuell in the midway betweene both the shipps by 1878. ynches, & that is 90. foote, which is as farre and rather farther than it is possible to see any shippe vpon the Sea: Neither is it possible to see any land farther, but such land as is verie high lande, which for the greatnesse of the height you may see it, wherefore 6. leagues or 7. leagues is called a kenne. Now the circularnesse of the Earth is the cause that you may see a shippe or land further out of the top, than vpon the hatches: wherefore it is a plaine case, that the earth and Sea is not flat, but circular, as is afore declared &c.

¶ The 19. Chapter, is as touching the making of Plats or Cardes for the Sea, and not to paint their Cardes as they doe, but rather to supply the vacant places with other necessarie matters: and also of three necessarie things contained in the Plats or Cardes, and their vses, which is the most necessary thing in Nauigation.

FOr the making of Plats or Cards, as touching Hidrographia, commonly called Sea cards, I meane to say little therof: for that it is sufficiently declared in y booke called the Art of Nauigation: Hauing this, I would wishe them that be makers of Plattes and Cardes for the Sea, not to paint their compasses with so many coulours: neyther vppon the lande with so many flagges, for that it doeth rather hurt than good: although it may be sayd, they be so painted in vacant

Not to paint their Sea-cardes, but so vse

cant places, those vacant places I would wishe them to furnish with these two matters in this order. First, in some vacant place with a Compasse there, to place against euerie point of the halfe of the Compasse, Letters, or some other figures or Carecters, then in like manner, (according to that place where such a Wynde maketh a full Sea) to make that Letter or Charecter at the hauen, port, or place: As for ensample thus: I place A. at the East point B at the East and by South. C. at the East Southeast. D. at Southeast and by East, and so consequently to all the points vnto the West, then that being done, where it floweth an East Wynde, I place A. in the Plat or Carde, and where an East and by South Wynde, I doe place B. in the Carde, and so forth, according to the place of the Wynde that maketh a full Sea. And where it runneth halfe tide vnder other, to make some note vpon the Carde in that place, &c.

the vacant places with other necessarie matter.

This also is verie necessarie to be done, to furnish vp all the vacant places of the Plat or Carde, to drawe the shape or fashion of euerie head land or high land alongst euerie Coast that is needfull to be knowen and at what point of the Compasse the land is of that fashion: at how farre off the lande riseth in that fashion: and so to make the fashion of the lande as often as the lande altereth the forme and fashion: and last of all, at what point of the Compasse the lande hath that shape or fashion: for being vppon one side, the land riseth of one fashion, and on the other side of another forme or fashion.

To draw the shape of the Land in their Cardes.

Also beeing neere the lande, it will be in one fashion, and beeing farre off in another fashion (as is before declared in the 14. Chapter) for there is nothing more needfull and necessarie for a Sea man than this: to knowe the land when he seeth it, and there is no way better to make him remember it, than to haue notes how the land doth rise vpon euery side, & what greater inconuenience

may

Great infirmities by mistaking any place.

may there grow by any meanes, that there may be mistaking of a place? for it were twentie tymes better to be throughly perswaded, that he knoweth it not, than to thinke he doth know it, not being that place. For whereas he doth thinke to preuent the daungers, he may willingly runne vppon the daungers, not knowen of him.

How necessarie a thing y Sea cards bee.

Therefore in my opinion they can doe no better than to furnish they^r vacant places in they^r Plats and Cardes with this matter: for there can be nothing better. The vse of the Sea Cardes is most necessarie for Nauigation for long voyages: first, for that it sheweth you how one place beareth from another: secondly, the distaunce of any place how farre the one is from the other. Of which the one is represented by the lines of the Compasse: the other by the scale or trunke of measure, if the plat be truly made. Thirdly, it sheweth you in what Latitude from the Equinoctiall or altitude of the Pole any place is in, by the line of degrees.

3. necessarie things in y Sea cardes.

Now to direct your course through the Sea by the card, to any place assigned, you must first loke by what point of the compasse it beareth from you, from the place you meane to set off from the land, vnto the place you would first fall with. Which you shall know thus: seeke a line from the nert compasse, vnto the place you meane to depart from, then open your compasses vnto one of those lynes by your iudgement that falleth neare vnto your place assigned: and let the other fote of your Compasses stand iust at that place where your shippe is, when you direct your course: that done, beare your hands forwardes euen, and let the one ende be still vppon the line to the which you dyd open your compasses, vntill you come to your place assigned. But if it falleth short of the place assigned, then take the nert lyne nearer vnto the place you departed from: when you haue so done, if your Compasses doo ouer-reach the place assigned, then take a

To know how any place doth beare from you by the Card.

lyne

lyne further off from the place you doe meane to set off from: and so shall you see by what point of the compasse the place assigned doeth beare from you &c. If you would know how farre the place assigned is from you, set the one foote of the compasses vpon the place you depart from, and stretch out the other foot vnto the place assigned iust, that done (standing still vnremoued) set them to the scale or trunke of measure, and that will shew you iustly how many leagues it is iust from the place of your departing vnto the place assigned. If the distance betweene the two places be more than the compasses will reach at once, then first set your compasses vnto the scale, opening the compasses vnto 100. leagues more or lesse, as your scale and compasses will giue you leaue at your discretion, after that set the one foote at the place of your departing, and the other foote of the compasses right towardes the place assigned, as oftentimes as the distaunce betweene the two places doth require, and then (the compasses being opened vnto 100. leagues) you may conclude it to be so many 100. leagues vnto the place assigned, as the compasses dyd shew vnto you: but if there be any odde measure, then open your compasses to that quantitie, and set that to the scale, and it will shew you the iust content of that measure, more than so many 100. leagues &c. Furthermore, touching the third commoditie which is to know what Latitude any place assigned hath: sette one foote of the compasses vpon the place assigned, and open the compasses vnto the nert East and West lyne, then carry that vnto the Lyne of degrees, keeping the foote of the compasses vpon the East and West lyne) it will shew iustly the number of degrees that the Pole is aboue the Horizon.

To know how far it is vnto any place by the card.

To know what Latitude or height of the Pole any place hath by the card.

So of these three waies, by the first is knowen by what point of the compasse any place beareth from you. By the second is knowen how farre distance it is vnto any place

assigned. And by the thirde is knowen in what height the Pole is, in any place assigned, &c. (Now this being knowen) you may with the more ease know how to attaine to come vnto the port or place assigned.

Yet furthermore, there is to be considered in (directing the course of a shippe to any place assigned) what impediments may be by the way: as tydes, currents, or the scātnesse of the winde, which may put the shippe vnto the leewards of his course, as also the surging of the Sea: and all this must be considered by the maister and Pilot of the shippe. Likewise also in long voyages, the winde may often shift vpon him, and sometime the winde may be such as he cannot lye his course: wherefore he must keepe a perfect account of the shippes way, and consider to know what point the ship hath made her way good by. And at euery time that the winde doth shift, and the ship cannot lye her course, to note in the carde or plat in what place the shippe may be: in hauing a speciall regarde vnto the way of the shippe, as touching the swiftnesse or slownesse that the ship goeth: and if so be the weather be cleare either by night or day, to take the true Altitude of the Pole: for by that they may correct the ships way, & giue a very neare gesse, how the place (assigned to goe vnto) doth beare from them, as also how farre it is thether, sauing onely in the East and West course: and then they haue no other help but onely the very account of the ships waye.

Things to be considered by the Master or Pilot of a ship.

They may correct the shippes way by y taking the height of the Pole.

And to correct their dead reckening by the Altitude of the Pole, they must doe this: (especially if the shippe haue hadde often trauerse by the meanes of contrarye wyndes, so that she could not lye her course,) consider vpon the carde or plat how long the ship hath made her way good, for so many points as the ship hath sayled by: then (if by the altitude of the Pole the shippe hath gone more than the dead reckening dyd shew you) repaire vn-

to

to the lyne of degrees, and set the one foote of the Compasses vpon the degree & place of the height of the Pole, and the other vpon the nert East and West lyne: that done beare it vnto the place you suppose the ship to bee in, and then bring forwards with the other compasses, what point of the Compasse the shippe hath sayled by, and at the meeting of the two paire of compasses, make a note for the place that the shippe is in: from which place you may with your Compasses see, how the place assigned doth beare, and also how farre off you be from the same.

Furthermore (if you finde by the height of the Pole that you are not so farre shot, as your reckoning did shewe vnto you) you must pull backe so much from the poynt that the shippe hath sailed by, as the height of the Pole doth shewe vnto you by the order before rehearsed, &c.

Furthermore (as I haue declared vnto you in the 14. Chapter going before) to know how farre the lande is off from you, knowing (as before) the distaunce betweene any two places, by setting the land with your Compasse, you may doe the lyke by your Card, as thus: you setting the two places with your compasse, do know that the two places bee so many leagues asunder, then shall you repaire to the Carde, and according to the bearing of the two places by the points of the compasse, you (beeing thwart of one of these two places) shall replye it with your compasses vnto your scale: But for that in the Scale the leagues bee so small, you may assigne twentie leagues to be but one league, and open the compasses vnto that proportion that the two places bee asunder, and the one of them doeth beare from the other: that done, open the Compasses againe from the center of the Compasse, vnto the place that you doe imagine to

be the land, & then reply it vnto the trunke of measure, and you shall see how many Leagues you bee from the shore, and so forth. So that you may see that the plat or carde is one of the necessariest things that is to bee vsed in Nauigation, &c.

The 20. Chapter is of the Longitude and declination of 32. notable fixed starres, verie necessarie for Nauigation, with tables of their shining, & at what point of your Compasse they doe both rise and set: and also Tables for euery moneth of the yeere, declaring at what houre and minute they be South, running from the first day of the moneth, to the fiftenth, & from the fiftenth to the last daye, and will continue these 100. yeeres without much error.

AND furthermore, I doe thinke it conuenient for diuers considerations, to shewe the Longitude and declination of certaine of the most notablest fixed starrs ỹ are nær vnto the Equinoctiall, to the number of 32. of them, which are very necessary for Nauigaton in diuers respects, as this: if you bee vnto the North parts where the North Pole is raised more than 50. or 60. degrees, then the North starre is too high to be obserued or taken with the Crosse staffe, (as I haue declared in the firt Chapter) and it may chaunce so that in the day the Sunne is not to be seene at noone, and then these starres may serue your turne.

If the Pole be raised more than 50. or 60. degrees, it is to high to be obserued by ỹ crosse staffe.

And furthermore they be very good for them that haue occasion to trauaile beyond the Equinoctiall, where the North

These starres will

North Pole is vnder the Horizon, in vsing their declination as they doe the Sunnes declination in all pointes, which doth appeare in the 7. 8. and 9. Chapters of this booke. And furthermore they bee verie necessarie for Sea faring men to know the houres of the night, both by their beeing vpon the Meridian, and also by their rising and setting you may know the true time of their rising and setting in euerie Latitude by their declination from the Equinoctiall, whether they decline to the south partes, or North partes, as is declared by the declination of the Sunne in the 11. Chapter.

serue beyonde the equinoctial. To know the rising & setting of these starres in all places by the order of the xii. Chapter. The order of the Table following.

And furthermore, by anye of these Starres you may trye the variation of your Compasse by night, &c. Now shall follow the Table of all these Starres. The first row of this Table containeth the names of the starres. The second, the signes, what they be in Longitude. The third, the degrees in the signes. The fourth, the minutes belonging thervnto. The fifth, the degrees of declination. The sixt, the oddé minutes belonging therevnto. The seauenth sheweth towardes what part they decline, by letters, of which S. signifieth Septentrionall, or North declination M. signifieth Meridionall, or south declination: as in the Table doth appeare.

The eight doth shew nothing but the bignesse of the starres.

Now followeth the Table.

A Table of the fixed starres.

The names of the starres.	Signes.	Longi. deg.mi.	Declin. deg.mi.	to what p... they decline	bignes of the starres.
Whales backe.	Aries	6. 6	12.11	M	second bignesse
Whales belly.	Aries	16. 2	12.20	M	second bignesse.
Rammes horne	Aries	27.42	17.19	S	third bignesse.
Rammes head	Taurus	1. 45	21.16	S	third bignesse.
Bulles eye.	Gemini	3. 42	15.42	S	great starres.
Orions left foote.	Gemini	10.12	9. 14	M	a great starre
Orions left shoulder.	Gemini	11.26	4. 37	S	a starre of the
First Orions girdle.	Gemini	16.22	1. 19	M	second light both
Orions right shoul.	Gemini	23. 66.	18	S	a great starre
Great Dogge.	Cancer	8. 40	15.30	M	a very great star
Lesser Dogge.	Cancer	20.10	6. 4	S	a great starre
Brightest in Hidra.	Leo	21. 2	4. 47	M	second bignesse
Lions nacke.	Leo	23.16	21.59	S	second bignesse
Lions heart.	Leo	23.32	14. 3	S	a great starre
Lions backe.	Virgo	5. 16	22.30	S	second bignesse
Lions tayle.	Virgo	15.32	16.46	S	a great starre
Rauens head.	Libra	5. 6	19.53	M	of the third bignes
Rauens wing.	Libra	9. 36	17. 8	M	both those
Virgins spike.	Libra	17.42	4. 54	M	a great starre
twixt Boots thighs	Libra	18. 6	22. 9	S	a great starre
South Balance.	Scopi.	9. 2	13.44	M	second bignesse
North Balance.	Scrpi.	13.12	7. 33	M	second bignesse
Scorpions hart.	Sagit.	3. 42	24.47	M	second bignesse
Hercules head.	Sagit.	8. 42	15.20	S	third bignesse
Serpents head.	Sagit.	15.52	14. 7	S	third bignesse
The Eagle.	Capric.	24.51	7. 28	S	second bignesse
Dolphins taile.	Aquar.	8. 27	10. 1	S	third bignesse
Goates taile.	Aquar.	17.22	14.13	M	third bignesse.
Water pourers leg.	Pisces.	2. 20	15.52	M	third bignesse
Pegasus sholder.	Pisces.	17. 4	13. 1	S	second bignesse
Pegasus legge.	Pisces.	23.10	26.30	S	second bignesse
Whales taile.	Pisces.	26.21	21.47	M	third bignesse

The vse of this Table is this: when you haue taken the height of any of these Starres vpon the Meridian, then loke what declination the starre hath from the Equinoctiall: if the starre hath North declination, then subtract or take away the starres declination from ỹ height: if it hath South declination, then adde or put vnto the height the starres declination, and that will shew vnto you the height of the Equinoctiall, and then by the height of the Equinoctiall, the height of the Pole is knowen, as the seuenth Chapter doth declare. And now I thinke it conuenient to make certaine Tables, to shew vnto you at what houre and time any of these starres be vpon the Meridian, whereby they may ỹ better know these stars. I will also shew vnto you how long any of these starres doe shine or tarrie aboue the Horizon in this Latitude from the Equinoctiall of London, that is at 51. or 52. degrees. And also at what point of the compasse any of these starres doe ryse or set, which will serue this 100. yeares without much errour.

How to vse the starres declinatiõ, to know the height of the Pole.

A Table to know the rising and setting of these Starres, by what point of the Compasse, & how many houres they be aboue our Horizon, the Pole being raised 51. or 52. degrees.

THE Whales back riseth East and by South, and vnto the Southwards: and shineth 10 houres ꝫ better.
The Whales belly (in a maner) as the Whales backe.
The Rammes horne riseth East Northeast, and setteth West Northwest: and shineth 15. houres 16 minutes.
The Rammes head ryseth East Northeast, and setteth West Northwest: and shineth 16. houres 4. minutes.
The Bulles eye riseth nere the East Northeast, and setteth

setteth nære the West Northwest, and shineth 15. houres 2. minutes.

The Orions left foote riseth nære the East & by south, and setteth nære the West and by South, and shineth 10 houres and 6. minutes.

The Orions left shoulder riseth East & to the Northwards, and setteth west and to the Northwards, & shineth 12. houres 45. minutes.

The first in Orions girdle doth rise a little to the south wards of the East, & setteth a little to the Southwards of the West, and shineth 11. houres 46. minutes.

Orions right shoulder riseth East, and vnto the Northwards, and setteth West and vnto the Northwards, and shineth 13. houres 12. minutes.

The great dogge riseth East Southeast, & setteth west Southwest, and shineth 9. houres.

The lesser Dog riseth East & vnto the Northwardes, and setteth West, and vnto the Northwards, & shineth 13. houres 10 minutes.

The brightest in Hydra ryseth East & vnto the Southward, and setteth West and vnto the southwards, & shineth 11. houres and 7. minutes.

The Lyons necke riseth East Northeast, and to the Northwards, and setteth West Northwest & to the Northwards, and shineth 16. houres 16. minutes.

The Lions hart riseth nære the East Northeast, and setteth nære the West Northwest, and shineth 14. houres 50. minutes.

The Lyons backe riseth nære the Northeast and by East, and setteth nære the Northwest and by West, and shineth 16. houres 26. minutes.

The Lyons tayle riseth nære the East Northeast, and setteth nære the West Northwest, and shineth 15. houres 12. minutes.

The Rauens head ryseth nære the East Southeast, and

and setteth nære the West Southwest, and shineth. 8. houres 12 minutes.

The Rauens wing riseth nære the East Southeast, and setteth nære the West Southwest, and shyneth 8. houres 50.minutes.

The Virgins spike riseth East and to the southwards, and setteth West and to the southwards, and shyneth 11.houres 4.minutes.

Betweene Bootes thighes, riseth nære the Northeast and by East, and setteth nære the Northwest & by west, and shineth 16.houres 20.minutes.

The south Ballaunce riseth nære the East southeast, and setteth nære the West southwest: and shineth 9. houres 36.minutes.

The North Ballance riseth nære the East and by south, and setteth nære the west and by south, and shineth 10.houres.38.minutes.

The Scorpions heart riseth nære the southeast and by East, and setteth nære the southwest and by West, and shineth 7.houres 5 minutes.

Hercules head riseth nære the East Northeast, and setteth nære the West Norwest, and shineth 14.houres 56.minutes.

The Serpents head riseth nære the East Northeast & setteth nære the West Northwest & shineth 14.houres, 40.minutes.

The Eagle riseth nære the East and by North, and setteth nære the West and by North: and shineth 13. houres 24.minutes.

The Dolphines taile ryseth East and by North, and setteth West and by North, and shineth 15.houres 57. minutes.

The Goates taile riseth nære the East southeast, and setteth West southwest, & shineth 9.houres 20.minutes.

The warer pourers leg, riseth nære ỳ east southeast,

and setteth West Southwest, and shineth 8. houres 54. minutes.

The 11. Chapter wil shew how longe any of these starrs will shine in all places

Pegasus shoulders riseth nere the East Northeast, & setteth nere the West Northwest and shineth 14. houres 32 minutes.

Pegasus leg riseth nere Northeast, and setteth nere Northwest, and shineth 17 houres 6. minutes.

The Whales tayle riseth East southeast, and setteth West southwest, and shineth 7. houres 48 minutes.

Furthermore if you desire to know the time of any of these starres being about the Horizon in all Latitudes, then repaire to the 11. Chapter, so you shall know it ther by their declination: euen by the same order that you know the Sunnes being aboue the horizon, by the Suns Declination.

	These ſtars being ſouth from the first day of Ianuarie vnto the 15.			Ianua. from the 15. to the laſt			Febru. from the 5. vnto the 15.			Febru. from the 15. to the laſt.		
1	Whales backe.	5.20	E	1 4.20	DA	1	3.20	DA	1	2.20	DA	
2	Whales belly.	5.54	E	2 4.54	DA	2	3.54	DA	2	2.54	DA	
3	Rammes horne.	6.28	E	3 5.28	E	3	4.28	DA	3	3.28	DA	
4	Rammes head.	6.45	E	4 5.45	E	4	4.45	DA	4	3.45	DA	
5	Bulles eye.	8.52.	E	5 7.52	E	5	6.52	E	5	5.52	DA	
6	Orions left foote.	9.23	E	6 8.23	E	6	7.23	E	6	6.23	E	
7	Orions left ſhoulder.	9.28	E	7 8.28	E	7	7.28	E	7	6.28	E	
8	Firſt Orions girdle.	9.50	E	8 8.50	E	8	7.50	E	8	6.50	E	
9	Orions right ſhoul.	10.12.	E	9 9.12	E	9	8.12	E	9	7.12	E	
10	Great Dogge.	11.4	E	10 10.4	E	10	9.4	E	10	8.4	E	
11	Leſſer Dogge.	12.0		11 11.0	E	11	10.0	E	11	9.0	E	
12	Brighteſt in Hidra.	12.4	M	12 11.4	E	12	10.4	E	12	9.4	E	
13	Lions necke.	2.12	M	13 1.12	M	13	12.12	M	13	11.12	E	
14	Lions heart.	2.13	M	14 1.13	M	14	12.13	M	14	11.13	E	
15	Lions backe.	3.0	M	15 2.0	M	15	1.0	M	15	12.0		
16	Lions tayle.	3.42	M	16 2.42	M	16	1.42	M	16	1.42	M	
17	Rauens head.	5.2	M	17 4.2	M	17	3.2	M	17	2.2	M	
18	Rauens wing.	5.19	M	18 4.19	M	18	3.19	M	18	2.19	M	
19	Virgins ſpike.	5.51	M	19 4.51	M	19	3.51	M	19	2.51	M	
20	twixt Boots thighs.	5.56	M	20 4.56	M	20	3.56	M	20	2.56	M	
21	South Balance.	7.16	M	21 6.16	M	21	5.16	M	21	4.16	M	
22	North Balance.	7.33	MD	22 6.33	M	22	5.33	M	22	4.33	M	
23	Scorpions hart.	8.54	MD	23 7.54	MD	23	6.54	M	23	5.54	M	
24	Hercules head.	9.14	MD	24 8.14	MD	24	7.14	MD	24	6.14	M	
25	Serpents head.	9.41	MD	25 8.41	MD	25	7.41	MD	25	6.41	M	
26	The Eagle.	12.19	DA	26 11.19	MD	26	10.19	MD	26	9.19	MD	
27	Dolphins taile.	1.12	DA	27 12.12	DA	27	11.12	MD	27	10.12	MD	
28	Cotes taile.	1.48	DA	28 12.48	DA	28	11.48	MD	28	10.48	MD	
29	Water pourers leg.	2.48	DA	29 1.48	DA	29	12.48	DA	29	11.48	MD	
30	Pegaſus ſhoulder.	3.47	DA	30 2.47	DA	30	1.47	DA	30	12.47	DA	
31	Pegaſus legge.	4.12	DA	31 3.12	DA	31	2.12	DA	31	1.12	DA	
32	Whales taile.	4.24	DA	32 3.24	DA	32	2.24	DA	32	1.24	DA	

March from the first to the 15.			March from the 15. to the laſt.			April from the first to the 15.			April from the 15. to the laſt.			May from the first to the 15.		
1	1.20	DA	1	11.20	DA	1	11.20	MD	1	10.20	MD	1	9.20	MD
2	1.54	DA	2	12.54	DA	2	11.54	MD	2	10.54	MD	2	9.54	MD
3	2.28	DA	3	1.28	DA	3	12.28	DA	3	11.28	MD	3	10.28	MD
4	2.45	DA	4	1.45	DA	4	12.45.	DA	4	11.45	MD	4	10.45	MD
5	4.52	DA	5	3.52.	DA	5	2.52	DA	5	1.52	DA	5	12.52	DA
6	5.23	DA	6	4.23	DA	6	3.23	DA	6	2.23	DA	6	1.23	DA
7	5.28	DA	7	4.28	DA	7	3.28.	DA	7	2.28	DA	7	1.28	DA
8	5.50	DA	8	4.50	DA	8	3.50	DA	8	2.50	DA	8	1.50	DA
9	6.12	E	9	5.12	DA	9	4.12	DA	9	3.12	DA	9	2.12	DA
10	7.4	E	10	6.4	DA	10	5.4	DA	10	4.4	DA	10	3.4	DA
11	8.0	E	11	7.0	E	11	6.0	DA	11	5.0	DA	11	4.0	DA
12	8.4	E	12	7.4	E	12	6.4	DA	12	5.4	DA	12	4.4	DA
23	10.12	E	13	9.12	E	13	8.12	E	13	7.12	DA	13	6.12	DA
14	10.13	E	14	9.13	E	14	8.13	E	14	7.13	DA	14	6.13	DA
15	11.0	E	15	10.0	E	15	9.0	E	15	8.0	E	15	7.0	DA
16	11.42	E	16	10.42	E	16	9.42	E	16	8.42	E	16	7.42	DA
17	1.2	M	17	12.2	M	17	11.2	E	17	10.2	E	17	9.2	E
18	1.19	M	18	12.19	M	18	11.19	E	18	10.19	E	18	9.19	E
19	1.51	M	19	12.51	M	19	11.51	E	19	10.51	E	19	9.51	E
20	1.56	M	20	12.56	M	20	11.56	E	20	10.56	E	20	9,56	E
21	3.16	M	21	2,16	M	21	1.16	M	21	12.16	M	21	11.16	E
22	3.33	M	22	2.33	M	22	1.33	M	22	12.33	M	22	11.33	E
23	4.54	M	23	3.54	M	23	2.54	M	23	1.54	M	23	12.54	M
24	5.14	M	24	4.14	M	24	3.14	M	24	2.14	M	24	1.14	M
25	5.41	M	25	4.41	M	25	3.41	M	25	1.41	M	25	3.41	M
26	8.19	MD	26	7.19	MD	26	6.19	MD	26	5.19	MD	26	4.19	M
27	9.12	MD	27	8.12	MD	27	7.12	MD	27	6.12	MD	27	5.12	MD
28	9.48	MD	28	8.48	MD	28	7.48	MD	28	7.48	MD	28	5.48	MD
29	10.48	MD	29	9.48	MD	29	8.48	MD	29	7.48	MD	29	6.48	MD
30	11.47	MD	30	10.47	MD	30	9.47	MD	30	8.47	MD	30	7.47	MD
31	12.12	DA	31	11.22	MD	31	10.12	MD	31	9.12	MD	31	8.12	MD
32	12.24	DA	32	11.24	MD	32	10.24	MD	32	9.24	MD	32	8.24	MD

A Table of the fixed ſtarres.

May from the 15. to the laſt.			June from the firſt to the 15.			June from the 15. to the laſt.			July from the firſt to the 15.			July from the 15. to the laſt.		
1	8.20	MD	1	7.20.	MD	1	6.20	MD	1	5.20	MD	1	4.20	M
2	8.54	MD	2	7.54	MD	2	6.54	MD	2	5.54	MD	2	4.54	MD
3	9.28	MD	3	8.28	MD	3	7.28	MD	3	6.28	MD	3	5.28	MD
4	9.45	MD	4	8.45	MD	4	7.45	MD	4	6.45	MD	4	5.45	MD
5	11.52	MD	5	10.52	MD	5	9.52	MD	5	8.52	MD	5	7.52	MD
6	12.23	DA	6	11.23	MD	6	10.23	MD	6	9.23	MD	6	8.23	MD
7	12.28	DA	7	11.28	MD	7	10.28	MD	7	9.28	MD	7	8.28	MD
8	12.50	DA	8	11.50	MD	8	10.50	MD	8	9.50	MD	8	8.50	MD
9	1.12	DA	9	12.12	DA	9	11.12	MD	9	10.12	MD	9	9.12	MD
10	2.4	DA	10	1.4	DA	10	12.4	DA	10	11.4	MD	10	10.4	MD
11	3.0	DA	11	2.0	DA	11	1.0	DA	11	12.0		11	11.0	MD
12	3.4	DA	12	2.4	DA	12	1.4	DA	12	12.4	DA	12	11.4	MD
13	5.12	DA	13	4.12	DA	13	3.12	DA	13	2.12	DA	13	1.12	DA
14	5.13	DA	14	4.13	DA	14	3.13	DA	14	2.13	DA	14	1.13	DA
15	6.0	DA	15	5.0	DA	15	4.0	DA	15	3.0	DA	15	2.0	DA
16	6.42	DA	16	5.42	DA	16	4.42	DA	16	3.42	DA	16	2.42	DA
17	8.2	DA	17	7.2	DA	17	6.2	DA	17	5.2	DA	17	4.2	DA
18	8.19	DA	18	7.19	DA	18	6.19	DA	18	5.19	DA	18	4.19	DA
19	8.51	DA	19	7.51	DA	19	6.51	DA	19	5.51	DA	19	4.51	DA
20	8.56	DA	20	7.56	DA	20	6.56	DA	20	5.56	DA	20	4.56	DA
21	10.16	E	21	9.16	DA	21	8.16	DA	21	7.16	DA	21	6.16	DA
22	10.33	E	22	9.33	DA	22	8.33	DA	22	7.33	DA	22	6.33	DA
23	11.54	E	23	10.54	E	23	9.54	DA	23	8.54	DA	23	7.54	DA
24	12.14	M	24	11.14	E	24	10.14	E	24	9.14	E	24	8.14	E
25	2.41	M	25	1.41	E	25	10.41	E	25	9.41	E	25	8.41	E
26	3.19	M	26	2.19	M	26	1.19	E	26	12.19	M	26	11.19	E
27	4.12	MD	27	3.12	M	27	2.12	M	27	1.12	M	27	12.12	M
28	4.48	MD	28	3.48	M	28	2.48	M	28	2.48	M	28	12.48	M
29	5.48	MD	29	4.48	MD	29	3.48	M	29	2.48	M	29	1.48	M
30	6.47	MD	30	5.41	MD	30	4.47	MD	30	3.47	M	30	2.47	M
31	7.12	MD	31	6.12	MD	31	5.12	MD	31	4.12	MD	31	3.12	M
32	7.24	MD	32	6.24	MD	32	5.24	MD	22	2.24	MD	32	3.24	M

A Table of the fixed starres.

Auguſt frō the firſt to the 15.			Auguſt frō the 15. to the laſt.			Septēb. frō the firſt to the 15.			Sep. from the 15. to the laſt.			Octo. from the firſt to the laſt.		
1	3.20	M	1	2.20	M	1	1.20	M	1	12.20	M	1	11.20	E
2	3.54	M	2	2.54	M	2	1.54	M	2	12.54	M	2	11.54	E
3	4.28	M	3	3.28	M	3	2.28	M	3	1.28	M	3	12.28	M
4	3.45	MD	4	3.45	M	4	2.45	M	4	1.45.	M	4	12.45	M
5	6.52	MD	5	5.52	MD	5	4.52.	M	5	3.52	M	5	2.52	M
6	7.23	MD	6	6.23	MD	6	5.23	M	6	4.23	M	6	3.23	M
7	7.28	MD	7	6.28	MD	7	5.28	M	7	4.28.	M	7	3.28	M
8	7.50	MD	8	6.50	MD	8	5.50	MD	8	4.50	M	8	3.50	M
9	8.12	MD	9	7.12	MD	9	6.12	MD	9	5.12	M	9	4.12	M
10	9 4	MD	10	8.4	MD	10	7.4	MD	10	6.4	MD	10	5.4	M
11	10.0	MD	11	9.0	MD	11	8.0	MD	11	7.0	MD	11	6.0	M
12	10 4	MD	12	9.4	MD	12	8.4	MD	12	7.4	MD	12	6.4	M
13	12.12	DA	13	11.12	MD	13	10.12	MD	13	9.12	MD	13	8.12	MD
14	12.13	DA	14	11.13	MD	14	10.13	MD	14	9.13	MD	14	8.13	MD
15	1.0	DA	15	12.0		15	11.0	MD	15	10.0	MD	15	9.0	MD
16	1.42	DA	16	12.42	DA	16	11.42	MD	16	10.42	MD	16	9.42	MD
17	3.2	DA	17	2.2	DA	17	1.2	DA	17	12.2	DA	17	11.2	MD
18	3.19	DA	18	2 19	DA	18	1.19	DA	18	12.19	DA	18	11.19	MD
19	3.51	DA	19	2.51	DA	19	1.51	DA	19	12.51	DA	19	11.51	MD
20	3.56	DA	20	2.56	DA	20	1.56	DA	20	12.56	DA	20	11.56	MD
21	5.16	DA	21	4.16	DA	21	3.16	DA	21	2.16	DA	21	1.16	DA
22	5 33	DA	22	4.33	DA	22	3.33	DA	22	2.33	DA	22	1.33	DA
23	6.54	DA	23	5.54	DA	23	4.54	DA	23	3.54	DA	23	2.54	DA
24	7.14	DA	24	6.14	DA	24	5.14	DA	24	4.14	DA	24	3.14	DA
25	7.41	DA	25	6.41	DA	25	5.41	DA	25	4.41	DA	25	3.41	DA
26	12.19	E	26	9.19	E	26	8.19	E	26	7.19	E	26	6.19	E
27	11.12	E	27	10.12	E	27	9.12	E	27	8.12	E	27	7.12	E
28	11.48	E	28	10.48	E	28	9.48	E	28	8.48	E	28	7.48	E
29	10.48	M	29	11 48	E	29	10.48	E	29	9.48	E	29	8.48	E
30	1.47	M	30	12.47	E	30	11.47	M	30	10.47	E	30	9.47	E
31	2.12	M	31	1.12	M	31	12.12	M	31	11.12	E	31	10.12	E
32	2.24	M	32	1.24	M	32	12.24	M	32	11.24	E	22	10.24	E

Octo. from the 15. to the last.			Nouēb. frō the first to the 15.			Nouēb. frō the 15. to the last.			Decēb. frō the first to the 15.			Decēb. frō the 15. to the last.		
1	10.20	E	1	9.20	E	1	8.20	E	1	7.20	E	1	6.20	E
2	14.54	E	2	9.54	E	2	8.54	E	2	7.54	E	2	6.54	E
3	11.28	E	3	10.28	E	3	9.28	E	3	8.28	E	3	7.28	E
4	11.45	E	4	10.45	E	4	9.45	E	4	8.45	E	4	7.45	E
5	1.52	M	5	12.52	M	5	11.52	E	5	10.52	E	5	9.52	E
6	2.23	M	6	1.23	M	6	12.23	M	6	11.23	E	6	10.23	E
7	2.28	M	7	1.28	M	7	12.28	M	7	11.28	E	7	10.28	E
8	2.50	M	8	1.50	M	8	12.50	M	8	11.50	E	8	10.50	E
9	3.12	M	9	2.12	M	9	1.12	M	9	12.12	M	9	11.12	E
10	4.4	M	10	3.4	M	10	2.4	M	10	1.4	M	10	12.4	M
11	5.0	M	11	4.0	M	11	3.0	M	11	2.0	M	11	1.0	M
12	5.4	M	12	4.4	M	12	3.4	M	12	2.4	M	12	1.4	M
13	7.12	MD	13	6.12	M	13	5.12	M	13	4.12	M	13	2.12	M
14	7.13	MD	14	6.13	M	14	5.13	M	14	4.13	M	14	2.13	M
15	8.0	MD	15	7.0	M	15	6.0	M	15	4.0	M	15	4.0	M
16	8.42	DM	16	7.42	MD	16	6.42	M	16	5.42	M	16	4.42	M
17	10.2	MD	17	9.2	DM	17	8.2	MD	17	7.2	M	17	6.2	M
18	10.19	MD	18	9.19	MD	18	8.19	MD	18	7.19	M	18	6.19	M
19	10.51	MD	19	9.51	MD	19	8.51	MD	19	7.51	MD	19	6.51	M
20	10.56	MD	20	9.56	MD	20	8.56	MD	20	7.56	MD	20	6.56	M
21	12.16	DA	21	11.16	MD	21	10.16	MD	21	9.16	MD	21	8.16	MD
22	12.33	DA	22	11.33	MD	22	10.33	MD	22	9.33	MD	22	8.33	MD
23	1.54	DA	23	12.54	DA	23	11.54	MD	23	10.54	MD	23	9.54	AD
24	2.14	DA	24	1.14	DA	24	12.14	DA	24	11.14	MD	24	10.14	MD
25	2.41	DA	25	1.41	DA	25	12.41	DA	25	11.41	MD	25	10.41	MD
26	5.19	DA	26	4.19	DA	26	3.19	DA	26	2.19	DA	26	1.19	DA
27	6.12	E	27	5.12	E	27	4.12	E	27	3.12	DA	27	2.12	DA
28	6.48	E	28	5.48	E	28	4.48	E	28	3.48	DA	28	2.48	DA
29	7.48	E	29	6.48	E	29	5.48	E	29	4.48	E	29	3.48	DA
30	8.47	E	30	7.47	E	30	6.47	E	30	5.47	E	30	4.47	E
31	9.12	E	31	8.12	E	31	7.12	E	31	6.12	E	31	5.12	E
32	9.24	E	32	8.24	E	32	7.24	E	32	6.24	E	32	5.24	E

NOw this Table serueth for euery moneth in the yeare (being exactly calculated) the time of their being south, or touching your Meridian, (or as some terme it) Mœnestead, seruing verie well the Sea-men to take ỹ height of them with their instrumentes vppon the Sea, referring it vnto the Table of Declination that goeth before: The first is the houres, the second the minutes, the third bee the letters that shewe you whether they bee South by day or by night, in the euening or morning in the forenoone or afternoone, of which the Letter E. doth signifie Euening, the Letter M. signifieth morning the letters DM. signifieth day in the morning, and the letters DA. signifieth day in the afternoone (as I saide before) the verie houre and minute of their being South. Now you se that I haue put to their being South in the day, as well as in the night, to the intent to knowe the houre of the night, as well by their setting, as also by your Compasse, which I shewed you in the first Chapter or Rule, namely to bring your 32. pointes, into 24. houres: And in lyke manner, in the fourth Chapter by shyning of the Moone to diuide the shining into equall partes, then those partes being equally diuided with the houre and minutes, and the time before they? being South, put together the halfe that shineth, and that sheweth the iust rising of the starres: and the other time of their shining after their being South sheweth their setting (as I declared in the rule of the shining of the Moone.) Now you, seeing the Table runneth from the first daye of euerie moneth to the 15. from the 15. to the last day, must consider, (if you will knowe the exact time betweene the first daye or the 15. daye, and betwirt the 15. day, and the last) to doe this, take how many dayes of the moneth is past, either from the first daie or 15. day, and pull foure minutes from that number: for so many dayes as is past, for euerie daie that shall shew you the true time of their

The signification of the letters in the table.

their being South. That knowen, you shall doe (as is afore saide) for their rising and setting.

¶ The 21. Chapter sheweth you the making of a generall Instrument, to knowe the houre of the day by, throughout all the world.

NOW for the making of your Instruments for the Sea, with their vses, you shall repaire to the booke of Nauigation, made by Martin Curtese a Spaniard, imprinted by M. Iugge, late Printer to the Quenes Maiestie: Else I woulde haue shewed you the making of diuers Instruments, as also the making of the Equinoctiall Diall with his vse, which is very profitable to knowe the houre of the day by, in all Latitudes through the whole world, for your Compasse is not to know the houre of ỹ day by the sunne, neither in the Morning nor Euening, neither can you know when the Moone is East or West, she hauing North declination, as being in the signe of Taurus, Gemini, Cancer or Leo, because your compasse standeth flat as doth your Horizon. Wherefore it is very good for seamen to vse the Equinoctiall dialls, for that it sheweth them the true houre of the day in all Latitudes, and also the Moone doth giue a true shadow in that Diall in all latitudes, for I do know that Seamen are very many times deceiued where it doth flow an East & West Moone, or any Poynt betweene the Southeast & Northeast. Because in setting the Moone with their Compasse (being in the North signes,) she seemeth to be East by the Compasse, when she is neere the East Southeast in her course: and in like manner when the Moone seemeth West by the Compasse, she shall be a little more than West Southwest in her course. Which is a very perilous

The Sunne and Moone do giue a full shadow by the compasse.

The Equinoctiall diall giueth a true shadow all ỹ world ouer.

A perillus matter.

lous matter vnto them that should put into a tide, harborow, or hauen, where he knoweth ther is water inough for him, if that he doth come at a full sea, and then by the error of the Mones shadow of ẏ compasse he is deceiued: & when he findeth the error, he thinketh ẏ the cause therof commeth by ẏ occasion of some storme of winde ẏ is like to follow, imputing vnto it, ẏ the tide doth not kæpe his course, whereas ẏ very cause groweth by no other means, but of receiuing a false shadow by ẏ Horizontal compasse: & especially if the Mone be nære her greatest declination vnto ẏ North parts, that is in ẏ signe of Gemini & Cancer And also ẏ effect is most preferred, if ẏ Dragons head bæ in ẏ beginning of ẏ signe of Aries: for ẏ then if ẏ Mone be in ẏ beginning of Cancer, she shal haue 5. degrees more in declination from ẏ equinoctiall, then the sun shal haue at their greatest declination vnto the North parts. So ẏ reseruing ẏ Mones paraler, which is according vnto the latitude of any place ẏ the Mone shal be declined 28. degrees & a halfe vnto ẏ Northpart of ẏ equinoctial: so that for auoyding of these infirmities, I would wish thē to vse the Equinoctiall dials. And furthermore, I do think ẏ the equinoctial dials be not vsed amongst our mariners hære in England, for ẏ the charges is so much in ẏ making of them, & yet it serueth no other turn but to know ẏ houre of ẏ day, & to shew ẏ true shadow of ẏ Mone. I haue not knowen thē vsed by any English master or pilot, but only by one man, which person had not it for the proper vse therof, but rather had it to say, that he had such an instrument as no English man had ẏ like, & to brag ẏ he had such an instrumet, ẏ he could do great feats therwith in going of long voyages, &c. I would haue no man offended wᵗʰ me. I know ẏ nature & qualitie of some that take charge, they will haue instruments & other things therunto appertaining, & yet they thēselues do not know the vse of them, yet they will seeme to be cunning, & that they

The Moone maye decline 28 degrees & a halfe from the equinoctiall.

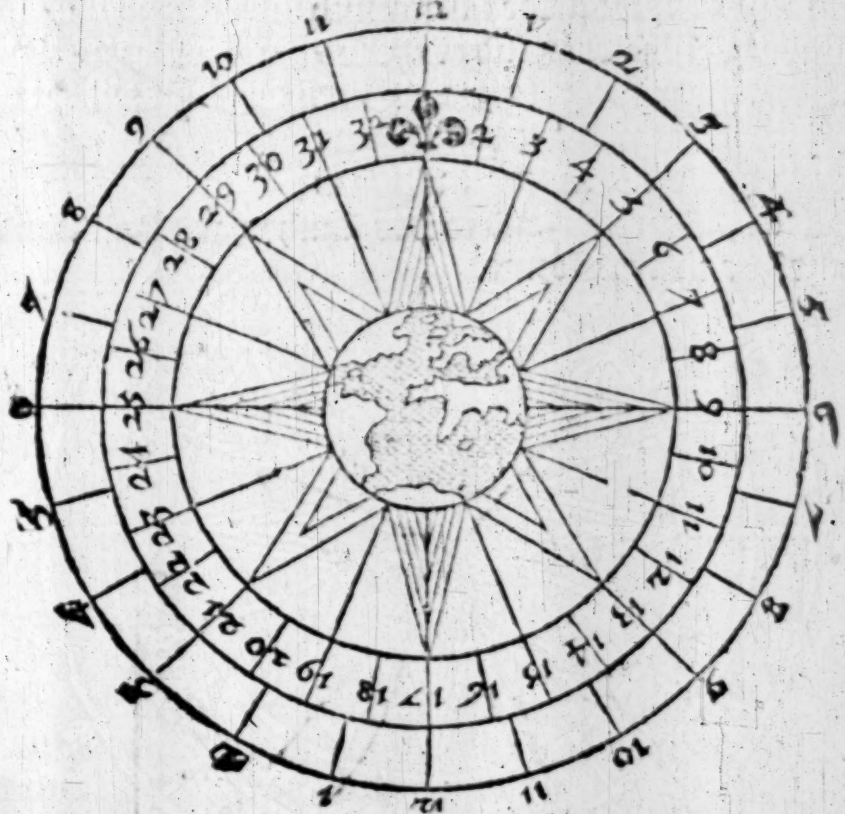
Of men that will haue Instruments

nædc

nãde no instructions of any man, for that they know all things, and yet in respect know nothing. (But notwithstanding) I would wish thẽ that be seafaring men, to vse themselues to the Equinoctiall dialls, for ỹ they do serue 2 notable turnes, as well at home in these our chãnells, as also in long voyages, they may make thẽ with a verie easie charge: for whereas in ỹ Art of nauigatiõ it is shewed how to make thẽ in braſſe, they may make thẽ with wood in this maner, take a peece of bords end of 6. inches broad more or lesse at your discretiõ, & halfe an inch in thicknes, then hauing cut it roũd & plained it smoth, you may either graue in it ỹ 32. points of the compaſſe, or else paint thẽ vpon it, with some coulours, with the 24. houres, vppon both the sides as this figure sheweth.

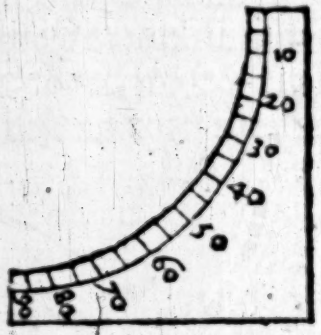
& know not ỹ vse of thẽ.

An easie way to make an Equinoctiall Diall with little charge.

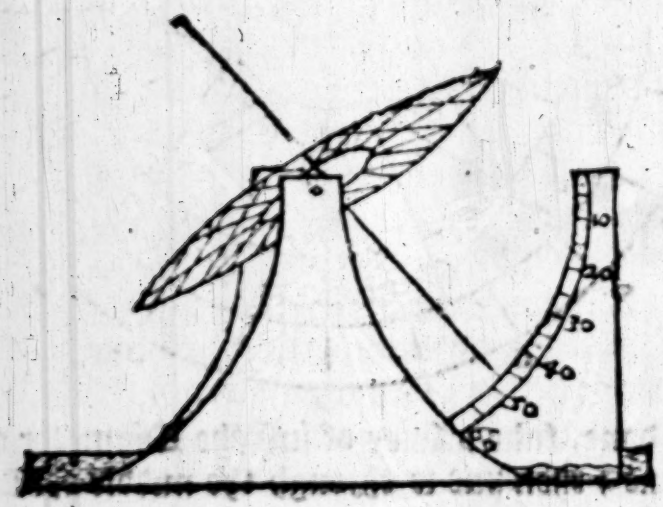


What done, take a wier of iust the Diameter of the Instrument, then put it through the middle or Center of the Instrument, then make it fast, that the one end be

halfe way thorough on the one side, and the other halfe on the other side: this done, make a frame with three peeces of bords endes, to hang the Diall or instrument vpon, with one pin on the East point, and an other on the west point: then take an other peece of bords end being square, and with a paire of Compasses strike a quarter of a circle, of iust the bignesse of the quarter of the Diall, and cut all that away, and then the rest of the square that is left (at the edge of the quarter of the circle) deuide into 90. equall parts, marking it thus, 10.20.30.40.50.60.70.80.90. As in this forme: last of all, let this be placed in the middle of the frame, so that 90. may stande right vnder the very middle of the Diall, and there made fast, in such forme that the very end of the wier when the Diall is put vp and downe may touch the hollow part that you see cut awaye, which is called the Directer, and so it is finished, and will stand altogether in this forme.



The Equinoctial Dial



The vse of this Diall is most necessarie in a ship, for that you haue occasions to transport your selues into all the climates. And to know the true houre of the day, doe this: Set this diall by your Compasse, (the directer vnto the Southwards) and then (you knowing how high the Pole is aboue the Horizon) set the end of the wyre right against ỳ degree, in the directer, and the other end of the wire will point iust vnto the Pole, then loke what shadow the wyre doth giue by the sunne, that is the true houre of the day. In like manner you may know ỳ true houre of the night by the Mones shadow, & also the Mone will giue a true shadow of her place, &c.

The 22. Chapter treateth of the soundings, comming from any place out of the Occident Sea, to seeke Vshant or the Lyzard, and so all alongst, till you come to the coast of Flanders: with other necessarie matters to be knowen to them that be Channellers, that doth occupy or deale amongst sands, bankes, or such other like.

BEcause it is necessarie to be had in memory, for that it is a daungerous place to hit or fall with, to enter into the shœue, comming homewards out of Spaine or Portugal, or from Barbarie, or any other place from the Southwards, a ship that commeth from any such place to seeke the Ile of Vshant, or the Lyzard, in this route of sounding of a 100. or 90. fadames shall finde big soundings, and shall be nære about to the seames. In the route of 80. fadames you shal find cockle shells & dents in the tallow of the lead: and in this sounding hold on your course to ỳ North, till you change sounding, then if you be at 60. or 64. fadame, you shall finde small sand & Pathey ground, and shall be nære the coast

The sounding neere vnto Vshant & ỳ Lizard.

coast of Vshant. If you haue time and day, goe seeke it in the Northeast, and you shall be about 10. leagues from the Isle. If you come making your course about Base reed, you shall finde course sand, redd and browne, and you shall haue sounding at 40. fadame: if you bee towardes the banke of Silley, you shall haue soundinges, at 86 or 90 fadame, & you shall finde in the tallow stonie grounde, and shall bee well shot towardes the banke of Silley. When you bee at 80. fadame, you shall finde small black sand, and shall be well towards the Lizard. When you be at 60. or 64. fadame, you shall finde white sand, and white soste wormes, and shall be verie nigh to the Lizard. Betweene the Cape of Cornewall and Vshant amidde the channell you shall finde 70. fadame and neere inough. Betweene Dodmon and the Forne, in the channell, you shall haue 40. or 50. fadame. If you bee thwart of Plummouth or the Start, you shall finde streamie ground and dents in the tallow and soundings 41. or 42 fadames. At the comming from Portland you shall haue 35. fadames, and small shingles. And when you be nigh to Portlande. 30. fadames, and stones like beanes, and this sounding will last till S. Aldam, and in the saide sounding you shall finde white stones lyke broken Aules, & other that be bigger, & then you shall be thwart of S. Aldam or of the Isle of Wight. Two or 3. leagues from the Isle of Wight, you shall finde 25. fadame, with dents and clefts in the tallow like small thrids, two or three leagues from the Caskets, you shall finde 40. fadame, & big stones ragged & blacke. Betweene the Isle of Wight & the Hag, the deepest is but 35. or 40. fadame. Betweene the Isle of Wight & Lantargat, the deepest is but 25. or 30. fadame. Betweene Beachy & the Isle of Wight a league from the land, you shall finde 38. fadame, and Poppell as bigge as Beanes, Betweene Fairely and the water of Summe in the deepest, but 25. fa-

The sounding in the channell.

25. fadame. Betwæne Folstone and Bollaene, is a banke that is called Kippe rappe: and lyeth in the myd way betwæne Pickardie and England, and hard abowd by it, is 26. or 27. fadame. In the straight of Calyce is 30. fadame, in the Rode of Calice is 16. fadame. And alongst the coast of Flaunders is but 20. fadame, the dæpest. Thus much haue I sayd for the enterance of the Slæue, to come to the Riuer of Thames, and in the enterance in the midway betwæne Vshant and Lizard, the Pole Artick is eleuated 50. degræs and a halfe, and the Equinoctiall is lifted aboue the Horizon 39. degræs and a halfe. And furthermore, for them that are Channellers and occuppyers amongst sandes and bankes, and such other lyke, they must haue consideration of these thinges following. As this: (first if you know how the Channell doth lie right betwæne any two sandes: you must view the lande to take some markes of it, in this maner to be a leading marke. And that you shall do thus: loke some thing that standeth farre into the lande, that you may know it well, being right open with the Channell of the sandes, then take an other marke nære vnto the Waters side, & the one to be right against the other, when that you be in the middle of the Channell: And then you knowing these two markes well, they will be leading markes vnto you for euer to kæpe that Channel. And then furthermore, if it doth so happen ỳ the channell doth turne to kæpe another course or else some other daunger lying in the waye) you must haue a thwart marke, to know both when that you are clære of any daunger, and also when that you are open of an other Channell, and that you shall doe as before is declared, to take some marke within the land, and also another nære vnto the sea, water, or riuers side to be your thwart marke when you bring them both together. And this is most specially to bæ noted: that these markes be verye

The height of the Pole at the enterance of the Sleeue.

Necessarie things to be noted for them that are Chahnellers and dæpellers amongst sandes.

yare,

yeare, and good when the one is farre distaunt from the other: and those marks very flowe asketh some distance in saying to open and shut them which are neere together vpon the lande. And furthermore, for them that are Channellers or occupyers amongst sandes, for that the weather is not alwaies clere, when they haue occasion to passe through such places, it is good for them to sound the chanels perfectly, and to knowe by the depth, what side of the channell they are vppon, and also how far they are shot into that channell. And also in lyke manner, to knowe by the sounding of any of the sides of the channel, whether they be neere any of the sands or daungers, or any breach off: for that some sandes or daungers there be hauing faire or good soundings or shaldings, that they may borrowe off and on at their pleasure. There be againe some sands or daungers, that ther is no borrowing nor sounding of them, and those be neall or deepe harde vnto the sands or daungers: for that the water is deepe hard vnto the sand: and these are verie daungerous sands for any ship to come neere, for that they shall haue the water verie deepe, and by and by be a ground. Yet furthermore, it is very good for them that be channellers and occupiers amongst sands, to knowe which waye the tide doth set at euerie time of the tide: for that many times it happeneth so, that when the sands be vnder the water, the tide doth set crosse the channell, which is a daungerous matter if it be not verie well considered by the Master or Pylot, &c.

¶ The 23. Chapter is as touching the variation of the cõpasse, called the Northeasting and the Northwesting of the Compasse; and how to giue a gesse to knowe the Longitude.

As

AS touching the variation of the Compasse called the Northeasting or Northwesting, it is supposed that the Compasse doth vary by proportion, in the sayling to the Eastwards or Westwardes: if it varieth by proportion, that the North point is varied one point from the North, at 22. degrees and a halfe, and so vntill the North point doth stand Northeast or Northwest. And that is, when you are 90. degrees from the Meridian that the compasse was made at, to ỹ Eastwards or westwards. Some also are of an other opinion, that the Compasse doth varie by no proportion, but doth varie according vnto the nature of some kinde of Mineralls, that is in some Countrey, or some kinde of Ilands, that drawe the Compasse by the mines of the Loadstone, or Magnes stone, that they touch their Compasse with when they make them. And furthermore, the Booke of Martin Curtise (called the Arte of Nauigation saith) that the Compasse doth varie by proportion in this manner: which is by the proportion of a Circle, for that the North point doth alwaies point vnto a place in the heauens that is vnmoueable, and therefore as you do transport your selfe to the Eastward or Westwarde, the North point, doth still point vnto that place in the heauen: wherefore (as he saith) when you be 90 degrees in longitude from the place ỹ the compasse doth stand due south and North, that is, when you be one quarter of the Circumference of the earth, in that Paralell the Compasse will be varied 4. points from the North: & as you do transport your selfe further, then the North point of the Compasse will come nærer & nærer vnto the North: and when you are iust halfe the circumference of the earth, that then the North point will stand due North vpon the Pole againe, for that you are come to the same

Of the compas to vary to euen proportion.

Of the compasse to vary by no proportion.

Of the compasse to vary according vnto [illegible]

S. Peru-

Meridian again vpon ỹ oppoſit part of ỹ earth (as it doth appeare in the 3. part & 5. cha. of the ſaid booke of Martin Curtiſe) but if that be true, then the compaſſe doth varie ſwiftly at the firſt, and ſlowly afterwards, in order like vnto the ſunnes declination: by which (if it be true) they maye very well knowe what order the Compaſſe doth varie by, and ſo by the variation you may giue a nere eſtimation of the longitude; and know in how many degrees the compaſſe is varied 1. point 2. points. 3. points, & ſo the greateſt variation, which is 4. points. Nowe to know the proportion, do this: Firſt make a circle with a paire of compaſſes, and ſtrike a line by the center to the circumference, which ſhall be your Meridian line, then ſtrike another lyne by the center a croſſe, ỹ you may deuide the circle into 4. equal parts, & then for ỹ 45. degrees is the greateſt variation, ſet 45. vnto the Eaſt part and weſt part, deuiding euerie one of the quarters of the circle into 45. equall parts, according to the greateſt variation: then make another circle of that Diameter, that the circumference touch that center of the circle, and deuide it as you deuided the compaſſe, after the rate of 32. points, although you neede not to deuide but that ſide to the Northwards, & then the Northeaſt and Northweſt point will fall vpon 45. degrees: that done, drawe lynes according to the points of the Compaſſe vnto the Eaſtwards or Weſtards, and loke how they fall vpon the lyne that commeth from the center of the other Circle: of which euerie quarter is deuided into 45. equall parts, & then (at the varie place that the line doth touch) drawe paralell lines in ỹ circle by proportion at the verie place to the Eaſtwards or Weſtwards, ỹ the line of the Compaſſe falleth vpon: & that will ſhew you iuſtly how many degrees you ſhall tranſport your ſelfe vnto ỹ Eaſtwards or Weſtwards for the varying of the firſt point, ſeconde point, and third point: and in like manner the greateſt varia-

To know in how many degrees going vnto the Eaſtward or weſtward that the cõpaſſe doth vary 1. point 2. Points or three points &c.

variation which is the fourth point. So that (according to that order) it will fall out in this manner, that the Compasse will be varied one point at nære eleuen and $\frac{1}{3}$. It will be varied two points nære about 24. degrees and a halfe.

To know how many degrees is in the varying of one Point.

It will be varied thrée points at fortie two degrées and about a halfe. But it will not be varied the fourth poynt vntill you be foure score and tenne degrées from the Meridian that the Compasse was made at: which is a very slow varying being 47. degrées and $\frac{1}{2}$. before the Compasse doth varie one point, and betweene the third Poynt and the second Point, being 18. degrées for the varying of that Point, and then from the seconde point vnto the first poynt is 13. degrées and better and last of all from the varying of one Poynt to the Meridian it is 11. degrées and $\frac{1}{3}$ part, euery degrée being according to that Paralell you are in, which doth alter according vnto your latitude from the Equinoctiall: for vnder the Equinoctiall it is 60. English miles or 20. English leagues vnto one degrée. In the latitude of 60. degrees from the Equinoctiall, there in that Paralell it is but 30. miles or 10. English leagues vnto one Degrée, &c. As it is plainly shewed in the 16. Chapter of this booke, wherein is an instrument shewing you how many miles of longitude will aunswere vnto a degrée in euery seuerall Latitude by the replying of a thrède at your discreation: So that I conclude, If the Compasse doeth varie, by that order of proportion that Martin Curtise doeth attribute vnto it, you maye giue a nære gesse to finde the Longitude by the varying of the Compasse being nære vnto the Meridian that the Compasse doth stand due South and North: But if you be very farre from the Meridian y the com-

passe was made for, then the variation is so slowe, that you can haue no iudgement at all (by the variation of the compasse) to finde any Longitude.

There may grow some error in the proportion of the varying of the compasse.

And furthermore, if the compasse doth varie by that proportion that Martin Curtise doth affirme, I am of that opinion, that there may grow some errour in proportion in those compasses that are made for any Meridian: for those compasses that are made here with vs in England, whereof the needle doth stand 4. or 5. Degrees vnto the Eastwardes of the North, (as doth appeare by all the needles made for Dialls, and also in the compasses) if they would haue the North point to stand due North, then the ende of the wiers vnder the carde of the compasse should stand foure or fiue degrees vnto the Eastwards of the Flouredeluce: wherefore it may be doubted, that the compasse may varie more the one way than it will the other way, by that proportion that the ende of the wier doth stand beside from the North poynt. For (if in the greatest variation) the ende of the wier (vnder the carde of the compasse) doth stand northwest, the Flouredeluce of the compasse shoulde stande nere halfe a point to the westwardes of the Northwest. And in like manner at the greatest variation, if the ende of the wier doth stande Northeast, then the Flouredeluce should stand nere halfe a point vnto the Northwards of the Northeast, &c. Wherefore the Compasses that is deuised by Norman, is very good to reforme those causes. But this cause is very speciall, to giue a nere gesse of the Longitude, that is to saye, the compasse will varie more quickely (according to the order before written) by which you see they may transporte themselues further into the Eastwards or Westwardes, before that the compasse doth varie one point, than it doth for the other three points, so that they are not able to giue any estimation at all, by the varying of the compasse,

O' slowe varying

passe to know any longitude: for that they may trauaile more then the quarter of the circumference of the earth, before the compasse will be varied one point backwards and forwards. of ỹ cõpasse

And furthermore, it is verie good for them that are masters or Pilots of shippes, to note, when they do fall with any land where the Compasse is varied, to make a remembrance in a booke, how many pointes and degrees the compasse is varied in euerie place where they come vnto, which will be a great helpe for them to finde that place againe. And to finde the variation, it is declared in the first chapter. Of making notes of the variation.

¶ A Hydrographicall discourse to shew the passage vnto Cattay fiue manner of waies, two of them knowen, & the other three supposed, wherein you shall know the distaunce vnto Cattay, and also by what points or windes of the compasse that you shall saile for the attaining thether, and also the rest of the East Indies.

WHereas it hath bene oftentimes in question of late yeres nowe in this our age, for the discouerie for to finde out away to come vnto Cattay, China, and the Ilands of Moluccas: with other places in the East Indies. I haue thought it good to write this Hydrographicall discourse, to goe vnto Cattay fiue manner of waies, for that ther is some people that are doubtfull whether that ther is any such place, other some is doubtfull that there is no passage thether.

So some holding one opinion and some annother, I haue taken vpon me for to shew vnto them the passage to go vnto Cattay fiue manner of wayes, whereof two of them are knowen, and the other three supposed.

Wherein I haue set downe particularly the courses,

that is to say, by what point of the Compasse that you must saile, and also the distance what number of leagues that it is from place to place, I hauing perused the best Cosmographers, & for that we haue no Charts or Plats Hydrographicall that doth shew the true courses and distaunce, it is possible that is not exactlye true, but onely to glaunce somewhat nere the matter: Therefore you must not take to haue it so certaine that there is no errour in it, neither I am assured that it is not altogether vntrue, neither in the distance nor courses, but that you may haue some aide by this, &c.

And first this, for to goe vnto Cattay that waye that the Portugalls doth goe vnto Calicut and the Ilandes of Moluccas, which is about by Cape bone Sperance, & nowe for to proceede to go that waie, and first this, for to depart from the Lizard or Cape of Cornewall, being the Westerne part of England, and for to make your direction from thence vnto the Canarie Ilandes, hauing latitude twentie eight and a halfe, the course is nere the South Southwest about fiue hundred leagues.

And on the Starbord side is the West Ocean sea, and on the Larbord side, first the coast of Fraunce, and then the coast of Spaine and Portugall, and then the coast of Barbarie in Africa, &c.

And from the Canarie Ilands vnto Cape de varde, in Ginney, the Latitude thereof is nere 15. Degrees, and the course is South about 270. leagues, and on the starbord side is the West Occeant Sea, and on the larbord side the Coast of Barbarie and Ginnie, and from Cape de Varde vnto Cape Palmas, the Latitude is nere 4 degrees, and the course is South and by East, about 230. leagues, and on the Starbord side is the Occeant Sea, and the larbord side, the coast of Ginnie. And from thence for to make your direction with Cape bone Sperance, being the Southermost parte of all Aethiopia, forsaking

saking the Coast, and to make your course thorowe the Sea, the course is nære the Southeast and by South, 1060. leagues, and the Altitude is the Antarticke Pole, about 35. Degrees aboue the Horizon, and on the Starbord side is Brasile in America, and the great River of Platte, and on the larbord side is the coast of Castill de Mine in Ginnie and Binney, and the coast of Aethiopia, &c. But if that you will kæpe the coast of Ginnie, then for to depart from Cape Palmas, for to goe vnto the Iland of Saint Thomas, then your course is East and by South, nære 560. leagues, and the Iland of Saint Thomas hath no Latitude, for that it is directly vnder the Equinoctiall, and on the starbord side is the Orceant Sea, and on the Larborde side the Coast of Castell de Mine, and the coast of Binnie, &c. And from the Iland of Saint Thomas, vnto Cape bone Sperance, the course is South and by East, about 750. leagues, and on the Starbord side is the Orceant Sea, and on the larbord side the coast of Aethiopia: and now from Cape bone Sperance, vnto ỳ great Iland of Saint Laurence, the Westermost parte of the Iland, and that hath Latitude towarde the Antarticke Pole, about 28. degræs, and the course is from Cape bone Sperance, Northeast and by East, about 550. leagues, and on the starbord side, is the vnknowen land that lyeth towards the Antarticke Pole, and the larbord side the coast of Aethiopia, and the length of the Iland is about 360. or 400 leagues, and the longest waye of the Iland doth lye East Northest and West Southwest, and is from the mayne lande of Aethiopia about 80. or 100. leagues, &c. And furthermore by the waye, I doe thinke it good for to shewe the course and distance vnto the red sea, and also the course and distance vnto Calicut. And first this, for to set out your course for to go from the Eastermost end of the great Iland of Saint Laurence, and that hath the Antartike Pole rayled 13. D. græs.

And

And for to goe with the straights of the redde Sea, the course is North and by East about 470. leagues, and the latitude of the straights, is about 10. degrees, towardes the North Pole, & this straights is greatly occupyed, for that all the Spices that serueth the Turkes dominions, and also some parts of Christendome, is brought from the Iland of Moluccas and other parts in the East Indies, as Calicut, and such lyke places, and so by shipping trãsported into the redde sea, and so put on land in Aegipt, and then carryed ouer a little part of the land, and then is newly embarked, & brought downe to the great Riuer of Nilus, and put a land at Alexandria in Aegipt, that is a Port in the middle earth sea, and from thence it is transported by shipping vnto a number of places both in the Turkes dominions, and other places Christened, &c.

And from the straights vnto the hether end of the red sea in Aegipt, the course is for the most parte Northwest and Nore Northwest, about nere 500. leagues. And going into the read sea, the starbord side is the coast of Arabia, & ỳ larbord side is first ỳ coast of Aethiopia, and Aegipt, &c.

And also if that you will goe from the East ende of the great Ilande of Saint Laurence, vnto the famous merchaunt Towne called Calicut in Indie, then your course is Northeast and to the Eastwards about 860. leagues, and the latitude is fiue degrees to the North parts, and on the starbord side is the Occean sea, and the larborde side is first the coast of Aethiopia, and the straights of the read sea, and the coast of Arabia, and the straights of the Persians sea, and the Ilands of Ormes, &c.

But if that you will holde on your course to goe vnto Cattay, then from the East ende of the great Ilande of Saint Laurence, for to goe with the great Ilande called Traprobane, your course is East Northeast, or East, and by North about 1100. leagues, but it is possible, that in these courses, you maye mete with a number of Ilands

lands, for that all this East Ocean Sea is very full of great and small Ilands, and the middle of this great Iland lyeth directly vnder the Equinoctiall, and the length of this Iland is neere 300. leagues, and on the Starbord side is the vnknowen landes, towardes the Antarticke Pole, and on the Larbord side the straights of the redde sea, Arabia, the Ilands of Ormes, the Persian sea, Calicut, and the great riuer of Ganges. And now for to depart from the great Iland of Traprobane, to goe vnto ỳ great Iland of Gelilow, being the greatest Iland amongst all the Moluccas, the course is East about 1000. leagues, but there lyeth a number of Ilandes in the way, and on the starbord side is the Iland of Iaue and Berno, and on the larbord side, the greatest heap of the Moluccas Ilãds. The Ilande of Gelilow hath no latitude, for that it lyeth directly vnder the Equinoctiall, and for to goe from the Iland of Gelilow, to go vnto the coast of China, the course is North and by West, about 500. leagues.

The latitude of China is about 25. degrees and on the starbord side is the South sea, and America, and the larbord side is the Ilandes of Moluccas: but for to goe from the great Ilande of Traprobane, the nert way to China, the course is Northeast and by East, 1000. leagues, and then on the starbord side, you shall haue all the Moluccas Ilandes, and the larbord side the maine land of Asia or East India, and then from the coast of China, vnto the great Baye of Quinsay in Cattay, the course is North and by East about 100. leagues, & the entraunce of the Baye of Quinsay, the latitude is 35. degrees, and on the starbord side is the firme lande of America, and the great Iland of Iupan, and the larbord side the coast of China and Cattay, &c.

Now thus much haue I sayd as touching the waye to come out of Englande to goe vnto Cattay, and East India, hoping that the reasonable Reader will not enuie

nice, for this vsing my discourse, neither you must not looke so exquisitely vnto it, for that it cannot be the exact truth: for as I do suppose that no English man hath seene any true Charte or Plat of all the East India, wherefore I doe suppose that you will beare with this my discourse, &c.

And now furthermore as touching this discourse for to come out of England to goe vnto Cattay, the seconde way, and that is knowen that the sea will let them haue passage, that is to say, through the straightes of Magalenos, and so into the south sea, as this, first to make their direction from the west part of England vnto ỹ straights of Magalenos, although that in deed ther can be no longe passage by sea, but that the ships are to seeke some places for to water at, and other easements, yet notwithstanding I do meane to make but one direction or course from England vnto the straights of Magalenos, for that the Maisters or the Pilots may seeke thier watring places most best for their purposes, &c. And first, from ỹ Lizard vnto the straights of Magalenos, the course is for the most parte south southwest and to the Westwards, about 2400 leagues, and the latitude of the straights is 52. degrees and a halfe towards the Antartick Pole, and on the starbord side is the firme land of America, & the larbord side Europe and Africa, &c.

And through the straights, the course may be West or West southwest 100 or 140. leagues before that they be clearely in the south sea, and now being into that sea, they may goe either into Cattay or the Moluccas, or the Port of Pannama, that is the place, that the king of Spaine hath all the treasure that commeth from Perro. And from thence it is carried vp a certain riuer, and then transported ouer the necke of a land, and then imbarked and brought down an other riuer, and so landed at Nomber the Deas, and from thence transported by

ships

shippes into Spaine, &c.

And now they being through the straightes of Magalenos, if that you will goe vnto the port of Pannama, then their course is for to goe Nornorwest, or Norwest and by Norte, or Norte and by West, as the lande will giue them passage, for that ther hath not bene made any true Plats for that Coast in that Sea, and doth containe in leagues from the straights vnto the Porte of Pannama, 1100. or 1200. leagues. But if that you wil goe from the straights vnto Cattay, as it is a Sea that is not vnto the South parts nere the straights not well knowen, so there may lye many Ilandes in that sea that you may mete with, and also there may be Rockes and daungers there in like maner that are not knowen, but the generall course is Norwest vnto Cattay or China, about 2800. leagues, hauing on the starbord side the maine lande of America, and on the Larbord side the vnknowen land that lyeth towardes the Antarticke Pole, and also the Ilands of Moluccas and Calicut, and thus much haue I sayde as touching the passage vnto Cattay, by these two wayes that are knowen. But here is one thing to be noted, for as it hath bene reported, that when that the Portugalls Carrickes doth goe vnto Calicut, that when that they be at Cape bone sperance, then they doe not directly set their course the nert way, but standeth South ouer towardes the lande that lyeth to the Antarticke Pole-wardes, and the cause thereof, is by the meanes of the great Current, that is at Cape bone sperance, continually running from the East into the West, and then when that they haue gone a hundreth or a hundreth and fiftie Leagues vnto the Southwardes of the Cape, then they set their Course for to goe with Calicut, so that outwards that they doe not come nere the great Ilande of Saint Laurence, but goe a great deale to the Southwarde of it, for that they will not be lette by the great cur-

rant : But when that they doe come homewards, then they doe come hard by the Ile of Saint Laurence, and so directly with Cape bone sperance, for that they will haue all the helpe that they may with the Current, then they goe West Northwest into the Sea with the maine lande of America, till that they be halfe that Sea ouer, and then they doe set their course to goe homewards, as it is not vnknowen, that when the Spanish Fleete doth goe vnto the West Indies, that when they goe outwardes, that they doe goe into the Canaries, and so West into the sea, and so holding in the south lande of the Baye of Mexico, for that they haue some helpe by the Current: but when that they doe come home, then they do come by the North land of the Baye of Mexico, betweene the Iland of Cuba and Terra Florida, for that they will haue the Current homewardes to helpe them. Also it is reported that in the straights of Magalenos, that the Current rūneth continually from the East into the west. Now this much haue I said, as touching the two waies vnto Cattay, for that it is knowen that there is passage by Sea, if that it were attempted, although the passage is very long, &c.

And now furthermore, for to discourse the third waye, that is not knowen, but supposed that it may be passageable, that is by the Northwest, as now of late Captaine Forbisher hath begun, and hath discouered as farre as a place nowe called Meta Incognita, which he himselfe did call Forbishers Straights, but yet notwithstanding it is doubtfull, whether that be a Straightes to giue passage to come into the East Ocean Sea, or south sea, for any thing that is knowen yet, it maye bee as well a Baye as otherwise, but notwithstanding whether that bee a Straight or not, it is possible that there maye be passage there about, betweene the Norther parte of America, as betweene Labradorre and Groynland, and

such

ſuch landes as lyeth vnto the North Pole-wardes.

Wherefore now for to depart from England to go vnto Cattay by the Northweſt, firſt this for to make their direction from the Weſt part of England, vnto the place called Meta Incognita, the courſe is Weſt Northweſt about 650. leagues, and the latitude thereof 63. Degrees, and on the Starboord is firſt Ireland and Iſeland, and Freeſeland, and on the Larboord ſide, is the Occean Sea. And now being at Meta Incognita, they muſt diſcouer there abouts, where that they may finde Sea for to giue them paſſage, & yet if they do finde ſea, they muſt hold on their courſe Weſt vntil ý they haue paſſed 1000 or 1100 leagues. For if that they ſhould hold on any Southerly courſe, then they ſhould imbaye themſelues in the maine land of America, for the ertention of the backe ſide, or North ſide of America, is not much leſſe then 1000. leagues, before that they ſhal open ý way into the Eaſt Occean Sea, and in this Weſt courſe on the Starboord ſide is the North Pole, and ſuch lands as lyeth that way if there be any, and on the Larboord ſide, is the maine of America.

And after that they haue ſailed Weſt 1000. leagues on the North part of America, they may then direct a more ſoutherly courſe, for that then they may be open of the Eaſt Occean ſea, for that the moſt parte of the beſt Coſmographers laye the opening of that ſea oppoſite vnto vs in our Meridian, & then holding on a ſoutherly courſe, then they may haue vnto the great bay of Quinſay about 400. or 500. leagues. And the latitude of ý North part of ý Bay of Quinſay in Cattay is about 46. degrees, and on the Starboord ſide is the coaſt of Aſia, as Mangie and Cattay, and on the Larboord ſide America. And thus much haue I ſaide as touching the third way to goe to Cattay, &c.

And now in like manner as touching the fourth way

to go vnto Cattay, not knowne but supposed, and that is by the Northeast part or North part of Russey, about by that way that Master Barrowes began the discovery, about by a land that is called Noua Zembla, which is a coũtry or point of a land that extendeth to the Northwards, it is not knowen how farre, & yet it may be possible that it is naungable that wayes if it were attempted.

And now for to passe that waye vnto Cattay, I will a lyttle vse my discourse. The way and distaunce vnto the North Cape in Norway is not vnknowen vnto a number of Sea menne, the Latitude thereof is 71. de. degrees. 20. minutes, therefore I doe thinke it best to beginne the direction and setting out the course East, vntill that they doe come with the lande of Noua Zembla, and then falling with that place to make their discouerie as the lande will giue them leaue, and so in this direction it maye be possible that they maye finde a Sea to giue them passage as it may be possible, that when they may mæte with lande, that they shall be constrained to goe Northeast or North Northeast, vntyll that the North Pole bee raised eightie or eightie fiue Degrees, yet they may holde on their course vntill such time that they shall bee incombred with Isle, for it may bee so, that in the Latitude of 80. Degrees, there shall bee no Isle, although that on the Coast of Baculayas, you maye haue Isle in the Latitude of 50. Degrees, for no man can tell vnto such time as it hath beene put in experience, and now in this passage vnto the Eastwardes from the North Cape vntill that they shall haue the sea open to come into the Southwards in the sea of Cattay, it may bee about 1000. or 1200. leagues, and then in this passage on the Starbord side is first Norway and Lapia, and the Baye of Saint Nicholas, and the greate riuer of Obe and Noua Zembla, and the East parte of Asia, and on the Larbord side the North Pole, and those landes

lands that lie that waies if there be any, and now in the following of the coast of the lande which may be south-east or South Southeast or South, it may be 500 or 600. leagues vnto the Bay of Quinsay in Cattay, and on the Starbord side is Asia and the coast of Mangie & Cattay, & on the larbord side the maine land of America, &c.

And furthermore, it may be possible for to finde passage for to go to Cattay, betweene Noua Zembla, and the countrie of Samwetes, through the sea of Vagates, & this passage may be somewhat shorter, then for to go vnto the Norwards of Noua Zembla, & then you shall haue in this passage vpon the starbord side, first the countrie of Samwetes, as Pichora, and the riuer of Obe and Tartaria, &c. And on the Larbord side, Noua Zembla, &c.

And this I doe ende as touching the Northeast passage to goe or attaine vnto Cattay the fourth waie, &c.

And furthermore as touching the fifth waie to goe vnto Cattay, it is possible that in my discourse it is meere folyshnesse and a thinge vnpossible for it to bee done, and yet notwithstanding no man can tell, before that it is put in experience, and yet it is the nerest way if that it bee nauigable, and my meaning is this, for to goe directly vnto the Pole, if so be that there is no land to let the passage. Now it is possible that some will say that it is the frosen Zone, but notwithstanding if that there is not land that waye, then it is not frosen, for the great salt Sea neuer freeseth, and for that you doe see the greate quantitie of Yse on the Coast of Labradorre and Baculayas, it is a token that there aboutes is much lande towareds the North Pole-wardes, and so is frosen in Soundes and Riuers, and so in the breaking vp of the yeare, that then it doth come driuing out to Sea: for in respect they doe seldome see any Yse at the North Cape, nor 100. leagues North off from thence, which is a great token that there is no land towards the

Pole

Pole-wards, and before that it hath bene put in proofe it cannot be knowen. But all the doubts for going vnto the Pole wards, is for feare of to much colde, & yet notwithstanding it may be reasonable warme right vnder the Pole for any thing that is knowen vnto the contrary, by the long continuance of the Sunne in summer, for that in the tyme of 9. weeks, that the sunne is neuer lesse then 20. degrees aboue the Horizon going round about them, so that the continuance of the sunne must inforce the aire to be reasonable warme, & especially if that ther is no Ile dwelling in ẏ sea, for it is not so cold at Meta Incognita, if that they be not amongst the Ile, for if that they be at sea and not amongst Ile, then it is very warme, and also if that they be a shore, then it is warme in like maner, so that the cold is by no other meanes but the cold breath or aire that commeth from the Ile. And now for to proceede to go vnto Cattay, and to go directly North till that they be right vnder the Pole, and then to go south to the opposite part beyond the Pole, which is to be done if ẏ they be not let by any land that lyeth in the way, then it may be possible for it to be done, and then the whole distance in this course from ẏ riuer of Thames vnto the Baye of Quinsay, is but 1680. leagues, which is a very short way in respect of the other. But now it is possible that some will make argument and say, that it is not possible for any man to make any direction or set any course being directly vnder the Pole, for ẏ it is not knowen which way that the compasse will stand, and also in like maner being vnder ẏ Pole, all places is south which way so euer you go, & also the sunne is equally one height, so that you can make no proofe which way is forwardes, & which way is backwards, therefore it is to be supposed, that some will say, that it is not possible to make any instruments to assigne any course to any place appointed, for truth it is, being vnder the Pole that any place assigned is South from them

them that is vnder the Pole, what quarter of the worlde soeuer that it is in, and if that the sea will giue them passage, their course is South to goe vnto it, &c. Yet notwithstanding I will shew vnto you what you shall doe to make a perfect direction vnto any place appointed you beeing right vnder the Pole, that you shall knowe whether that you doe goe backwards or forwards or any other way that you shall appoint, so that you may see the Sunne, and that must be done, as this. First prepare a perfect good clocke that goeth with a Spring and to be made in that order that the directer or pointer doth goe round in 24. houres, and so to be marked for to ende 24. houres at noone, and then to begin one, and this clocke or Diall being well made and doth keepe the time truelye, then when that you doe approch neere the Pole within 100. leagues, that is the latitude of 85. degrees, and so farre the Compasse may serue, and also you may correct the Compasse well inough, for that the Sunne is 10. degrees higher on the South part, than it is on the North part, and now going within 5. degrees of the Pole, set your clocke to worke, and 24. houres to be noone, and then when that you are directly vnder the Pole, loke if that the Pointer doth stand vpon 24 houres, then that part or quarter that the sunne is in, is right back again, and if it point 12 houres, then towards the sun-wards is right forwards, and if that it point 6. houres, then towards the sun-wards doth shewe, that if any place bee west from the place that you did come from, and is one quarter of the earth, that direction wil set you right vpon it, & if 18. houres, then towards the Sunne doth appoint you that place that is East one quarter of the earth. &c.

And nowe for to set any course to stirre the ship vpon any place appointed, then note this as for an ensample, I would goe directly homewardes, and then I will set the Flie of a Compasse before him that shall stir

and then for that I come out North and I must go home South and lay the Card or Flye stedie before me, & the south point right with the ships head or stem, and so I do set the clocke by it, now if that the clocke doth point 24 houres for that afore was my none, then I do stirre the ship right vpon the Sunne, and if the clocke doth appoynt 3. hours, then he that doth stirre must kæpe the Sunne vpon the southwest, and so shall the ship go that south that she came from, and if that the clocke doth poynt 6. houres, then he that doth stirre, must kæpe the Sunne vpon the west point, and if the clocke shewe 9. then kæpe the Sunne vpon the Norwest. If the clocke doth shew 12. then the sun must be on the North poynt, that is right with the starne of the ship. And if the clocke doth shew 15. houres, then he that stirreth must kæp the sunne vpon the Northeast point, if 18. then the Sunne ont he East point, and if 21. houres, then on the southeast point, &c. But now if ỹ you would goe directly forwards, then lay the North point right with the ships head, and when the clocke doth point 12. then stirre right vpon the sunne, and so in like manner to stirre by the sunne as I haue afore shewed you by ensamples, so that you may sæ by this clocke or dial, you may assigne your selfe to kæpe any course into any place in the whole world, you being vnder the Pole, and then when that you are departed from the pole 100. leagues, that is 5. degræs, then you may vse your compasse, and correct it by the sunne at your plesure. And thus much I haue saide as touching the passages to goe vnto Cattay, wherefore gentle Reader beare with my rudenesse, for that I am so bold to vse my discourse vpon the passage vnto Cattay. And furthermore, some men hath ben of that opinion, that when that they are in the East Ocean sea that they shall meete with no shipping, as about Cattay and China, &c. But notwithstanding it is a sea that there is a huge number

of

of ships both great and small, for this must be most certaine that wheras ther is such great trade of Marchandize, and also such a number of Ilands both great and small, and also such a number of commodities in those Ilands, so that any man may iudge that there is great store of ships, and also ordinance in their shipping, &c. And it is not vnknowen but that the great Cane of Cattay, is a Prince of great power as well by sea as by Lande, then iudge you whether that such a prince of such a force and welth but that they will prouide for all things meete for warres. Therefore as soone as they come into those coasts they must orderly vse the trade of Marchandize, & not to vse force, &c. As vpon a time I being with Master Dee at his house at Murclacke, we falling in talke about the discouerie to Cattay & so talked as touching the shipping whereupon he opened a Booke and shewed me a note what number of ships the great Cane had readie at one time to goe vnto sea about his affaires, surely you would thinke it vncredible, the number was 15000 surely a huge armie by Sea: and then I replyed againe that it might be that they were but small things, and yet they might call them shippes, and then he turned vnto another place where the great Cane did send one of his daughters by Sea, and did appoint 14. of his ships, and the least of the 14. shippes had 250. Mariners, beside all the rest of his daughters traine, and such Nobles as did accompanie hir, which must be no small number. Therefore it is most manifest that the Cane is a great Prince of power as well by Sea, as by Land.

FINIS.

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of this Booke.

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1587.

GRAMMATICA

RHETORICA

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